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FOOD TECHNOLOGY ABSTRACTS

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OOD
ECHNOLOGY
BSTRACTS

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CONTENTS

ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 1]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro–[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

950

Potty (VH). **Impact of new industrial policy on development of food processing industry.** *Indian Food Industry* 11(4): 1992: 20-27

Statistics of the various types of primary and secondary food processing industries in India, the evolution of industrial development policy, impact of the new industrial development policy on the different components of food processing sector and on the development of food industry, specified food industries that come under the new policy, the change in the socio-economic environment, food processing and export scenario of food materials, glimpses of the food processing and market place changes in India, futuristic situation of food resources and food industry and the changing market perceptions are the aspects presented in this article. CSA

FOOD PROCESSING

951

Gibbons (RJ). **Vision for food processing.** *Food Australia* 44(10): 1992: 456-458

This article reviews some image processing techniques suitable for the agricultural and food environment and the difficulties in their application, current applications, current research on image processing for agricultural and food applications, future directions and limitations of image processing. 25 references. SRA

952

Harlfinger (L). **Microwave sterilization.** *Food Technology* 46(12): 1992: 57-59, 61

Microwave processing of foods offers product as well as processing advantages over conventional sterilization processes. The advantages offered are (1) microwave sterilization can deliver products that tastes good because microwaves are able to heat product 3-5 times faster than conventional sterilization systems (2) the microwave-sterilized product is not temp. abused, so the food looks better, has better texture and tastes better (3) products can be transferred directly from the packaging line and do not have to be batched or loaded onto racks and (4) increased automation and reduced labour requirement. CSA

953

Schlegel (W). **Commercial pasteurization and sterilization of food products using microwave technology.** *Food Technology* 46(12): 1992: 62-63

Use of microwave technology to continuously pasteurize or sterilize food products can provide a variety of benefits such as improvement of food quality; extension of shelf-life without using preservatives; maintenance of natural appearance, crunchiness and flavour; lower distribution of cost because of longer shelf-life; energy savings; low maintenance costs, minimal personnel; and technology that is environmentally friendly. CSA

954

Parrott (DL). **Use of ohmic heating for aseptic processing of food particulates.** *Food Technology* 46(12): 1992: 68-72

The development of ohmic heating which operates by the direct passage of electrical current through the continuous flow of food product is discussed in this article. Heat penetration throughout the product is far more rapid and even, resulting in high levels of flavour retention and particulate integrity. Aspects covered are thermal processing options, ohmic heating, ohmic aseptic processing, (equipment sterilization, processing, alternative cooling, cleaning, production capacity), product quality (process validation, cook value) and the potential applications. CSA

FOOD PACKAGING

Packaging materials

955

Technology Information Forecasting and Assessment Council (NewDelhi). **Packaging materials industry in India.** *Indian Food Industry* 11(4): 1992: 42-46, 27

Presents an overview of the percentage usage of major packaging materials for bulk and consumables, the current consumption pattern of various raw materials used for packaging, the status of the material processing technology and the product-wise technologies in use and the emerging ones are detailed in this article. CSA

FOOD ENGINEERING AND EQUIPMENT

956

Mcguire (J) and Yang (J). **The effect of drop volume on contact angle.** *Journal of Food Protection* 54(3): 1991: 232-235

The effect of drop vol. on the equilibrium contact angle, used in evaluation of food contact surface properties, was measured for liquids exhibiting both polar and nonpolar character on 6 different materials. Drop vol. used ranged from 2 to 40 µl. Contact angles were observed to increase with increasing drop vol. in a range below some limiting value, identified as the critical drop vol. (CDV). The CDV varied among materials and is explained with reference to surface energetic heterogeneities exhibited by each type of solid surface. AA

957

Sastry (SK). **Application of ohmic heating to continuous sterilization of food.** *Indian Food Industry* 11(4): 1992: 28-30, 41

The fundamentals of ohmic heating of food, the mechanism of microbial death, results of the observation made on ohmic heating of liquid-particle mixtures and the important issues to be considered during the design of an ohmic heating process are the aspects dealt in this article. CSA

958

Schiffmann (RF). **Microwave processing in the US food industry.** *Food Technology* 46(12): 1992: 50-52, 56

The origin of industrial microwave heating, criteria for processing with microwaves, the reasons for success and failure of potato chip drying, chicken processing, bacon cooking, precooking of sausage patties, meat tempering, pasta drying, donut proofing and frying, bread baking and pasteurization using microwave systems are discussed in this article. CSA

959

Datta (AK) and Hu (W). **Optimization of quality in microwave heating.** *Food Technology* 46(12): 1992: 53-56

The ranges of typical heat-generation rates and temp. rise for microwave and conventional heating are compared. The results show that the microwave heating generally produces less thermal degradation of food products than conventional heating processes, but this is not always true. CSA

960

Schrader (GW), Litchfield (JB) and Schmidt (SJ). **Magnetic resonance imaging applications in the food industry.** *Food Technology* 46(12): 1992: 77-83

The article introduces the basic principles of Magnetic Resonance Imaging (MRI), reviews some of the current applications of MRI to food-related research (internal composition and quality factors, volume measurement and parameter mapping, mass transfer and structural changes, heat transfer and food stability) and discusses the future applications of MRI in the food industry (shorter imaging times, solids imaging, microscopic MRI, imaging probes and gradient systems, contrast agents and on-line sensing). CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

961

Gomez (R) and Fernandez-Salguero (J). **Water activity and chemical composition of some food emulsions.** *Food Chemistry* 45(2): 1992: 91-93

The mean a_w values for various food emulsions assayed were 0.904 plus or minus 0.050 for butter samples, 0.914 plus or minus 0.028 for margarines and 0.947 plus or minus 0.013 for mayonnaises. The linear regression equation $a_w = 0.954 - 0.03\ m$ could predict a_w for butter and margarine with an error < 0.02 units from the NaCl content of their aqueous phase (m) while that for mayonnaises could be predicted through the Chen equation for mixtures of solutes. SD

962

Nakao (Y). **Curdlan: Properties and application to foods.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991: 736-742 (Ja)

963

Hamada (JS). **Effects of heat and proteolysis on deamidation of food proteins using peptidoglutaminase.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 719-723

Enzymatic methods were developed for the deamidation of food proteins. Modification of proteins by peptidoglutaminase was dependent on their size and conformation. After such treatments as heat or alkali solubilization, which might have partially broken hydrogen and disulphide bonds, peptidoglutaminase deamidation of proteins increased by proteolysis as a function of percent peptide bond hydrolysis (DH), up to 54-fold at 20%

DH. With prior heat treatment at 100°C for 15 min, followed by proteolysis and alkali solubilization of soy protein, casein and gluten, over 48, 37, and 39% protein deamidation can be achieved, respectively. AA

964

Losada (PP), Lozano (JS), Abuin (SP), Mahia (PL) and Gandara (JS). **Kinetics of the hydrolysis of bisphenol F diglycidyl ether in water-based food simulants. Comparison with bisphenol A diglycidyl ether.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 868-872

The first-order degradation kinetics of Bisphenol F diglycidyl ether (BFDGE) in 3 water-based food simulants [3% (w/v) acetic acid, distilled water, and 15% (v/v) ethanol] at various temp. were studied. BFDGE and its first and second hydrolysis products were determined by reversed phase HPLC with fluorescence detection. Nonlinear regression was used to fit the experimental data at 40, 50 and 60°C with the proposed kinetic equations; the Arrhenius equation was then fitted to the rate constants obtained, and the kinetic models were tested by comparing experimental data obtained at 70°C with kinetic curves calculated using the rate constants predicted for this temp. The half-life of BFDGE was longest in ethanol and shortest in acetic acid. The difference between the hydrolysis rates of BFDGE and Bisphenol A diglycidyl ether may be due to 10% of the BFDGE used being in n = 1 monomer form. The results imply that resins which comply with existing legislation on the migration of unreacted monomer may still contaminate foodstuffs. AA

Chemistry(Analytical)

965

Landry (J) and Delhaye (S). **Simplified procedure for the determination of tryptophan of foods and feedstuffs from barytic hydrolysis.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 776-779

A procedure simplifying the treatment of barytic hydrolysate prior to chromatographic analysis of tryptophan was tested on 8 samples of foods and feedstuffs. It involves the addition of 5-methyl-tryptophan as internal standard to the mixture subjected to hydrolysis, the dilution of a very small vol. (3 µL) of liquid phase of cold (0°C) hydrolysate with 1 mL of pH 4.5 buffer, and the chromatography of aliquots after dilution. Tryptophan was evaluated from 5-methyltryptophan. The simplified procedure compared with the conventional one, using the remainder of hydrolysate and requiring acidification, quantitative transfer, and clarification, gave identical results irrespective of samples. It is convenient and precise and leads to routine detn. of tryptophan of a large number of samples. AA

966

Santerre (CR), Cash (JN) and Zabik (MJ). **The decomposition of daminozide (alar) to form unsymmetrical dimethylhydrazine (UDMH) in heated, pH adjusted, canned solutions.** *Journal of Food Protection* 54(3): 1991: 225-229

Processing conditions were chosen to determine the influence of temp., pH and processing on model sol. containing daminozide residues. Daminozide (succinamic acid 2, 2-dimethylhydrazide) fortified sol. (12.5 p.p.m.) containing 50mM NaH_2PO_4 and 24% sucrose (w/w) were adjusted to pH 3.0, 3.6 or 4.0 and either heated (100°C for 0, 5, 10 or 15 min in sealed cans and cooled or heated (80°C) for 0, 5 or 10 min in open cans, sealed, heated (100°C) for 5 min, and cooled. Daminozide degradation due to heating was < the HPLC detection limit (1.5 p.p.m.) for all of the treatments. Unsymmetrical dimethylhydrazine (UDMH) concn. was significantly affected by heating time, pH and processing. Heating of daminozide sol. in sealed cans produced approx. 1 p.p.m. of UDMH for every min of heating at 100°C. Heating of daminozide sol. in open cans at 80°C resulted in simultaneous production of UDMH in the sol. and loss of UDMH through volatilization. Max. degradation of daminozide was observed at pH 3.6. AA

967

Kaur (H) and Kawatra (BL). **Effect of deep fat frying on the nutritive value of some commonly used fried products.** *Beverage and Food World* 19(4): 1992: 28-29

Presents proximate chemical composition (per 100 g) and mineral contents (mg) of deep fat fried products. Poori:crude protein (CP) - 9.40, ether extract (EE)-8.90, ash-1.15, crude fibre (CF)-1.5, Ca-41.45, Fe-4.52, Zn-0.28, phytin P (PP)-124.0; mattar:Cp-9.18, EE-11.75, ash-0.18, CF-0.2, Ca-20.29, Fe-2.72, Zn-0.80, PP-22.0; pakoda:CP-14.9, EE-15.55, ash-3.08, CF-0.4; Ca-43.90, Fe-3.25, Zn-0.29, PP-34.0; Bread pakoda:CP-15.09, EE-14.6, ash-1.76, CF-0.6, Ca-30.50, Fe-3.08, Zn-0.34, PP-28.0. BV

Chemsitry

968

Karmas (R), Buera (MP) and Karel (M). **Effect of glass transition of rates of nonenzymatic browning in food systems.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 873-879

The effect of glass transition on nonenzymatic browning of dehydrated vegetables and of model systems (composed of amino acids and sugars reacting in matrices with different physical characteristics) was studied. Glass transition temp. (T_g) was determined by differential scanning calorimetry. The rates of nonenzymatic browning were taken from the literature for vegetables and were determined for model systems by measuring absorbance at 280 and 420 nm. Rate constants were analyzed as a function of temp. (T) and of (T - T_g). Browning below T_g was very slow. Changes in activation energy (which were affected by structural changes) could be detected near the glass transition. A complete predictive model must include the variables T, (T - T_g), m, and concn. of reactants. AA

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

969

Singhal (RS), Sajilata (M) and Kulkarni (PR). **Enzymes as indices of food quality.** *Beverage and Food World* 19(4); 1992; 20-21

A brief description of role of enzymatic indices in quality control of foods is outlined in this review. The food products covered are dairy products; vegetables and fruits; fish and shell-fish products; meat and poultry products, and wheat flour. 16 references. BV

Fermented foods

970

Kozaki (M). **Microbiological studies on traditional fermented foods in Southeast Asia.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(7); 1991; 651-661 (Ja)

Review. 54 references. BV

Tempeh

971

Penaloza (W), Davey (CL), Hedger (JN) and Kell (DB). **Physiological studies on the solid state quinoa *tempeh* fermentation using on-line measurements of fungal biomass production.** *Journal of the Science of Food and Agriculture* 59(2); 1992; 227-235

A quantitative approach to the on-line measurement of fungal biomass, based on the biomass-dependent changes in electrical capacitance at 0.30 MHz, was exploited to optimise the solid-substrate *tempeh* fermentation of *Chenopodium quinoa* Willd by *Rhizopus oligosporus* Saito. Variables including the mould strain, the initial pH, the inoculum density and the substrate moisture content influenced the mycelial development and quality of quinoa *tempeh* prepared in petri dish fermentation units. It was found that *R. oligosporus* isolate UCW-FF8001 at an inoculation density of 3.5×10^4 cfu/g of quinoa substrate at 620 g kg^{-1} moisture content yielded both the highest biomass and the best quality *tempeh*. AA

Microorganisms

972

Fung (DYC) and Chain (VS). **Comparative analysis of Redigel and aerobic plate count methods for viable cell counts of selected foods.** *Food Microbiology* 8(4); 1991; 299-301

The Redigel system uses a calcium pectate gel in place of agar in an alternative method for determining aerobic colony counts in food. The system was compared with the conventional Aerobic Plate Count method for the detn. of each food being tested. The correlation coeff. for each food product ranged from 0.10 (wheat flour) to 1.00 (pecans) with an overall correlation of 0.964. The Redigel system can be used as a conventional alternative method for the enumeration of bacteria from foods. AA

Bacteria

973

Wel (CI), Balaban (MO), Fernando (SY) and Peplow (AJ). **Bacterial effect of high pressure CO_2 treatment on foods spiked with *Listeria* or *Salmonella*.** *Journal of Food Protection* 54(3); 1992; 189-193

Studies were carried out to assess the use of high pressure CO_2 treatment for controlling pathogenic microorganisms in model food systems. *L. monocytogenes* suspended in distilled water was completely killed after CO_2 treatment at 6.18 MPa (61.2 atm.) and 35°C for 2 h. Contary to CO_2 treatment, the use of N_2 at these experimental conditions failed to exert bactericidal effect. High pressure CO_2 treatment at 13.7 MPa (136.1 atm) and 35°C for 2 h was shown to effectively kill *Salmonella* in spiked chicken meat (> 95%) and egg yolk (> 100%), and kill *Listeria* in spiked shrimp (> 99%), orange juice (> 99%), and egg yolk (> 99.4%). Such treatment was, however, less effective in killing *Salmonella* in a whole egg-*Salmonella* mixture.

Furthermore, this treatment caused a twofold increase in bacterial numbers in a whole egg-*Listeria* mixture. N_2 gas under similar experimental conditions did not kill the spiked bacteria in these 4 food systems. High pressure CO_2 treatment technique could possibly be applied to reduce microbial load in some food systems. AA

974

Chain (VS) and Fung (DYC). **Comparison of redigel, petrifilm, spiral plate system, isogrid, and aerobic plate count for determining the numbers of aerobic bacteria in selected foods.** *Journal of Food Protection* 54(3): 1991: 208-211

The numbers of aerobic bacteria from chicken, ground beef, ground pork, shelled pecan, raw milk, thyme, and flour (20 samples from each food) were determined by 4 alternative viable cell count methods (Redigel, Petrifilm, Spiral Plate System, and Isogrid) to ascertain the effectiveness of these methods in providing viable cell counts compared with the widely used Aerobic Plate Count (APC) method. The results indicated that all 5 methods were highly comparable (r = 0.97 and higher, with the exception of Petrifilm versus Spiral Plate System, which was 0.88) and exhibited a high degree of accuracy and agreement. Thus, the 4 alternative methods were found to provide accurate aerobic bacterial counts of foods compared with the APC method. AA

975

Decallonne (J), Delmee (M), Wauthoz (P), El Lioui (M) and Lambert (R). **A rapid procedure for the identification of lactic acid bacteria based on the gas chromatographic analysis of the cellular fatty acids.** *Journal of Food Protection* 54(3): 1991: 217-224

This study was conducted to develop a rapid numerical procedure for the analysis of gas chromatograms of lactic acid bacteria fatty acid methylesters (FAMEs), along with an examination of some experimental conditions which affect the fatty acid composition of these bacteria. FAME detn. was carried out using high resolution GC (HRGC). Although the nature and the proportion of fatty acids differed among strains, some major components, n-C14:0, n-C16:1, n-C16:0, n-C18:1, n-C18:0 and C19 cycl, were found as a group to represent more than 90% of the whole cellular fatty acids. The differences found in the relative composition of the long-chain fatty acids in paired chromatograms were used to calculate a "distance coefficient", based on the differences found for the most important fatty acids, after their prior ranking. The procedure was initially validated with identified species, used as reference strains; then, unknown lactic acid bacteria isolates were compared to these references. The method proved to be useful for rapid comparisons between strains, provided a strict standardization occurred prior to routine application. AA

Listeria monocytogenes

976

Smith (JL), Marmer (BS) and Benedict (RC). **Influence of growth temperature on injury and death of *Listeria monocytogenes* Scott A during a mild heat treatment.** *Journal of Food Protection* 54(3): 1991: 166-169

The growth temp. of *L. monocytogenes* has a profound effect on injury and death of washed cells that are suspended in phosphate buffer and exposed to 52°C for 1 h. The temp. of 52°C has low lethality for cells grown at 37 or 42°C, but there was a 10^3 - 10^4-fold increase in killing for cells grown at 28, 19, 10 or 5°C. There was little injury with exposure to 52°C of cells grown at 5, 10 or 19°C, but injury increased as the temp. of growth increased. When cells were grown anaerobically, lethality induced at 52°C increased as the growth temp. decreased, but there was more injury under anaerobic conditions than for aerobically grown cells. The results indicate that *L. monocytogenes* cells growing at low temp. are more susceptible to heat induced death. AA

977

Wenzel (JM) and Marth (EH). **Behaviour of *Listeria monocytogenes* in the presence of lactic acid bacteria in an agitated medium with internal pH control.** *Journal of Food Protection* 54(3): 1991: 183-188

An agitated medium with internal pH control (IPCM-2) was inoculated to contain *L. monocytogenes* (strain V7, Scott A or California) at ca. 10^3 CFU/ml and *Streptococcus cremoris* (*Lactococcus lactis* subsp. *cremoris*) or *Streptococcus lactis* (*Lactococcus lactis* subsp. *lactis*) at 0.25 or 1.0%. The inoculated medium was incubated with shaking in a waterbath at 30°C for 30 h. *L. monocytogenes* and lactic acid bacteria were enumerated and pH was determined at appropriate intervals. The area on a figure between curves for the control and treatment and designated as the area of inhibition (AI) was calculated and used to quantify inhibition of each strain of *L. monocytogenes* for a particular set of conditions in IPCM-2. Statistical analysis of AI values calculated from data obtained at 6, 24 and 30 h of incubation revealed no significant ($p < 0.05$) difference in inhibition among the 3 strains of *L. monocytogenes* for each type of lactic streptococcus present. *Streptococcus cremoris* was significantly ($0.01 < p <$

0.05) more inhibitory to all 3 strains of *L. monocytogenes* than was *S. lactis* at 24 and 30 h of incubation. IPCM-2 is considered ready for use at a pH of 5.4 or less, which was reached between 12 and 15 h of incubation in samples containing 0.25 or 1.0% *S. cremoris*. Populations of *L. monocytogenes* in such samples were ca. 10^4 to 10^6 CFU/ml regardless of strain of *listeria* or percentage of *S. cremoris* added as inoculum. In samples initially containing 0.25 or 1.0% *S. lactis*, pH 5.4 was not reached until after 18 - 24 h of incubation. At this point all 3 strains of *L. monocytogenes* had grown to ca. 10^5 CFU/ml regardless of percentage of *S. lactis* added as inoculum. Despite the inhibition seen, substantial numbers of the pathogen were present when the medium was ready for use. AA

978

McCarthy (S). **Attachement of *Listeria monocytogenes* to chitin and resistance to biocides.** *Food Technology* 46(12): 1992: 84-87

The effects of 3 sanitizers iodine, chlorine and quaternary ammonium compound on both suspended *L. monocytogenes* cells and cell attached to chitin flakes are described. The study confirms that attached cells are more resistant than suspended cells to disinfection and that older cultures are more resistant than younger cultures. CSA

Fungi

Aspergillus parasiticus

979

Janardhana Reddy (M), Shekara Shetty (H), Fanelli (C) and Lacey (J). **Role of seed lipids in *Aspergillus parasiticus* growth and aflatoxin production.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 177-181

The seed lipids of groundnut (*Arachis hypogaea* L.), paddy (*Oryza sativa* L.), sorghum (*Sorghum bicolor* (L.) Moench), cowpea (*Vigna unguiculata* L. Walp) and green gram (*Vigna radiatus* L. Wilezek) were studied for their ability to support growth and aflatoxin B_1 (AFB_1) production by *Asp. parasiticus* NRRL 2999. Results indicated that groundnut with the most lipids supported greatest AFB_1 production. All crops except for sorghum and paddy, powdered seed material (PSM) supported more AFB_1 production than their respective defatted PSM. Higher the amount of lipid content of seed or seed components, higher was the growth and AFB_1 biosynthesis. Seed lipids thus seem important in determining growth and AFB_1 production by *Asp. parasiticus*. BV

Yeasts

980

Kanawjia (SK), Khanna (R) and Singh (S). **Yeast nucleoproteins - a bioproduct for food usage.** *Indian Dairyman* 44(12): 1992: 584-587

Reports modified engineering techniques to manufacture high quality and novel food products from yeast nucleoprotein. Preparation of yeast protein with low nucleic acid content, problems associated with yeast protein to make it acceptable, inexpensive, safe source of protein; functional properties of yeast nucleoprotein for food usage are discussed. GS

981

Seiler (H). **Some additional physiological characteristics for the identification of food-borne yeasts.** *Netherlands Milk and Dairy Journal* 45(6): 1992: 253-258

A total of 2664 yeasts were isolated from cheese brines, cheese, quarg, yoghurt, and fruit preparations. These were identified based upon a set of 67-71 characteristics routinely used in yeast identification. In addition, the reactions assimilation of D-lyxose, D-turanose, gentibiose, N-acetyl-D-glucosamine and D-arabitol were evaluated. These 5 characteristics yield clear reactions and are very species-specific, whereby they present themselves as further characteristics in yeast differentiation, especially for testing in microtitration plates. AA

Hygiene

982

Smith (JL). **Foodborne toxoplasmosis.** *Journal of Food Safety* 12(1): 1991: 17-57

In this review, several aspects of *Toxoplasma gondii*, an obligate intracellular protozoan parasite which causes toxoplasmosis, a disease of mammals and birds, including its survival, its distribution in the environment (water, soil) and animals (coprophagous invertebrates, cattle, swine, sheep, goats, fowl, horses, wild and zoo animals, reptiles, dogs and cats), its presence and survival in foods (beef and veal, small game animals, fowl, horse meat, deer and elk meat, mutton, lamb and goat meat, pork, nonmeat foods), elimination of *T. gondii* from foods, detecting its antibody, its transmission to humans (ingestion of oocysts, ingestion of tissue cysts, prenatal transmission), and role of virulence factors (host-penetration factor, toxins, immunosuppression, resistance of phagocytosis, phospholipase, inhibition of fusion of

parasitrophorous vacudes) are reviewed. In addition, human toxoplasmosis, its treatment and prevention, and the economic aspects of the disease (congenital toxoplasmosis, noncongenital toxoplasmosis and the impact on the food industry) are also discussed. 208 references. CSA

BIOTECHNOLOGY

983

Patel (RK). **Biotechnology and dairying.** *Indian Dairyman* 45(1): 1993: 4-6

Reviews the application of biotechnology in dairy industry for the genetic improvement of animal breeds; use of animals as bioreactors to produce rare proteins: improved dairy starter cultures; dairy enzymes; accelerated cheese ripening; efficient whey utilization; and biological stabilization of dairy wastes. GS

984

Romero (DA). **Bacteria as potential sources of flavour metabolites.** *Food Technology* 46(11): 1992: 122, 124-126

The potential of bacteria to produce various flavour metabolites (diacetyl, alkylpyrazines, terpenes and aromatic compounds), precursors and enhancers as well as enzymes that can be used to produce flavour compounds is discussed in this article. CSA

985

Nagodawithana (T). **Yeast-derived flavours and flavour enhancers and their probable mode of action.** *Food Technology* 46(11): 1992: 138, 140-142, 144

This article discusses the production of yeast derived products, the development of improved yeast extracts (by autolysis, plasmolysis and hydrolysis), production of autolysates and flavour enhancers as well as the elucidation of the mechanisms of flavour perception, enhancement and synergism. CSA

986

Bigelis (R). **Flavour metabolites and enzymes from filamentous fungi.** *Food Technology* 46(11): 1992: 151, 154-156, 158, 161

The production of flavour metabolites (citric acid and gluconic acid) directly by fungal fermentation, isolation of enzymes (carbohydrases, nucleolytic enzymes, lipases and proteinases, enzymes that remove off-flavours, enzymes that extract flavour constituents) from filamentous fungal cultures and their use to make flavour compounds, the role of filamentous fungi in influencing the flavour of fermented foods (cheese, oriental fermented foods, cured meat) are the aspects discussed in this article. The potential for application of genetically engineered filamentous fungi to the production of novel flavour peptides is also considered in brief. CSA

987

Reade (L). **The hard cell.** *Food Manufacture* 67(9): 1992: 37-38

Application of biotechnology in extending shelf-life, to improve food quality and protection of crops from the ravages of drought and sunlight is briefly discussed. SRA

988

Seshadri (CV) and Umesh (BV). ***Spirulina* - a nutritious food for the masses.** *Invention Intelligence* 28(8): 1992: 252-256

Discusses briefly large scale cultivation of *Spirulina* on specially designed ponds. The various steps involved in the production of *Spirulina* are shown in a flow chart. Also covered in this article are the composition (per 100 g) of *Spirulina* (protein 65 - 71%, fat 6.7%, crude fibre 9.3%, carbohydrates 16.0%, vitamins, minerals and essential amino acids) and uses. BV

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antibrowning agents

989

Radha Iyengar and McEvily (AJ). **Antibrowning agents: Alternatives to the use of sulphites in foods.** *Trends in Food Science and Technology* 3(3): 1992: 60-64

This review focuses on the recent advances in the study of anti-browning agents, with particular emphasis on their use in food industry (fruits, vegetables and beverages). Although sulphites are effective at inhibitory browning, adverse health effects associated with sulphite usage and increased regulatory scrutiny have created the need for substitutes. Anti-browning agents discussed are: reducing agents (ascorbic acid and ascrobyl

derivatives, sulphydryl compounds), chelating agents (EDTA, phosphate-based compounds - sodium acid phosphate, polyphosphate, metaphosphate and 'Sporix"), acidulants (citric acid, malic acid, tartaric acid, malonic acid, phosphoric acid, HCl), polyphenol oxidase (resorcinols, aromatic carboxylic acids, aliphatic alcohols, amino acids, peptides and proteins, anions, kojic acid), complexing agents (cyclodextrins, chitosan), enzyme treatments (ring-cleaving oxygenases, catechol transferase, protease) and combinations of anti-browning agents. 33 references. BV

Colourants

990

Nayak (RR) and Kulkarni (PR). **The world of food colours.** *Beverage and Food World* 19(4): 1992: 31-34

Briefly discusses types of food colours (natural, synthetic), safety of food colours, legal aspects of food colours, newer sources of food colours, non-absorbable polymeric food colours and browning in foods. BV

Flavourings

991

Werkhoff (P), Guntert (M) and Hopp (R). **Dihydro-1,3,5-dithiazines: Unusual flavour compounds with remarkable organoleptic properties.** *Food Reviews International* 8(3): 1992: 391-442

All alkyl-substituted and bicyclic 1,3,5-dithiazines identified in the flavour of foodstuffs and in model systems are discussed in this review. Also provides general description of the sensory properties of 1,3,5-dithiazines, reports on results and research developments in order to update information in the area of flavour compounds. 81 references. SRA

CEREALS

992

Kochar (GK) and Sharma (KK). **Fibre content of common Indian food grains.** *Bulletin of Grain Technology* 29(2): 1991: 113-116

The chemical composition of fibre content in common 4 Indian cereals and 7 legumes and their products were determined. Neutral detergent fibre (NDF g/100g of DM) in cereal and whole legumes ranged from 2.85 (rice) to 12.50 (wheat), 3.50 (refined wheat flour) to 8.40 (wheat flour) and 13.00 (kidney beans) to 18.00 (chickpeas), 3.30 (blackgram washed) to 15.00 (dried peas) respectively. Refining and washing decreased NDF content. The importance of dietary fibre is emphasised because low fibre intake may cause ischaemic heart diseases, diabetes, diverticular diseases of colon, colon cancer and other gastrointestinal tract diseases. GS

Paddy

993

Pillaiyar (P), Singaravadivei (K), Desikachar (HSR) and Subramaniyan (V). **Low-moisture parboiling of paddy.** *Journal of Food Science and Technology (India)* 30(2): 1993: 97-99

Soaking paddy at 70°C for 1 h, draining and tempering hot for 4 h, restricted the kernel moisture to about 25% (wb) with even distribution of moisture in core - a condition just enough to get a normal parboiled rice without white core. This paddy, on steaming at 0 kg/cm^2 for 10 min to gelatinize the starch, contained 26 - 27% (wb) moisture and resulted in 20 - 25% saving in drying time. Pre-steaming/high soaking temp./longer soaking period increased the grain moisture appreciably. AA

MILLETS

Corn

994

Osuji (GO) and Cuero (RG). **Regulation of ammonium ion salvage and enhancement of the storage protein contents of corn, sweet potato, and yam tuber by N-(carboxymethyl) chitosan application.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 724-734

The biochemical approach to storage protein enhancement via NH_4^+ ion metabolism was investigated by treatment of growing yam tuber, sweet potato, and corn with N-(carboxymethyl) chitosan (NCMC). Application of NCMC to yam gave rise to α-ketoglutarate (αKG)-dependent inhibition of the glutamate synthase (GOGAT) with an inhibition constant (K_I) of 3 mM but relieved the αKG-dependent inhibition of the glutamate dehydrogenase (GDH), with a concomitant 270% increase of the storage protein content. In sweet potato, NCMC application gave rise to glutamate-dependent inhibition of the glutamine synthetase (GS) with K_I of 15 mM but relieved the inhibition of the GDH by high αKG concn., with a concomitant doubling of the storage protein contents. In corn, NCMC application also gave rise to αKG-dependent inhibition of the GOGAT with K_I

to αKG-dependent inhibition of the GOGAT with K_I of 0.5 mM but relieved the αKG-dependent inhibition of the GDH, with a concomitant doubling of the storage protein content. NCMC treatment also reduced the levels of some of the high mol. wt. polypeptides (deaminating) while it increased the levels of some of the low mol. wt. polypepetides (aminating) of GDH. Therefore, NCMC enhanced the storage protein contents of the crops by enhancing NH_4^+ ion salvage. AA

Sorghums

995

Grimmer (HR), Parbhoo (V) and McGrath (RM). **Antimutagenicity of polyphenol-rich fractions from *Sorghum bicolor* grain.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 251-256

Polyphenols extracted from a bird-resistant sorghum (*S. bicolor* (L) Moench) grain cv SSK 30 were separated into 3 crude fractions: non-tannin polyphenols with small M_r (F_1); proanthocyanidins with M_r values between 2000 and 10000 (F_2); and proanthocyanidins with much larger M_r values of around 10000 - 50000 (F_3). Each fraction was tested for mutagenicity using mutants of *Salmonella typhimurium* (the Ames test) or the somatic mutation and recombination test (SMART) employing *Srosophila melanogaster*. None of the fractions was positive with either test. On the other hand the crude polyphenols all acted as antimutagenes when coincubated with mutants of *S. typhimurium* and standard mutagens (sodiumazide, daunomycin and 2-aminofluorene). The order of antimutagenicity was $F_3 > F_2 > F_1$, a decrease with decreasing M_r. It is possible that a different mechanism of polyphenol antimutagenicity occurs against the mutagen sodium azide when compared with the mutagens daunomycin and 2-aminofluorene. AA

Kisra

996

Ahmed (AM), Singh (B) and Singh (U). **Improvement of sensory and nutritional qualities of sorghum-based '*Kisra*' by supplementation with groundnut.** *Journal of Food Science and Technology (India)* 30(2): 1993: 121-126

Studies were conducted to assess the feasibility of supplementation of sorghum flour with groundnut flour for *kisra* preparation. Flour samples of 4 sorghum cvs were supplemented with 0, 10, 15, 20, 25 and 30% of defatted groundnut flour, and *kisra* prepared was studied for sensory and nutritional qualities. The quality of sorghum flour *kisra* with groundnut flour upto 30% was found to be satisfactory and acceptable as judged by sensory evaluation. Protein and lysine contents of *kisra* increased by 73% as a result of supplementation of sorghum with 30% groundnut flour. At this level of supplementation, the ratios of leucine to isoleucine and leucine to lysine were significantly decreased and *in vitro* protein digestibility of *kisra* increased. The results are of importance in improving the nutritional status of the diets of people in semi-arid tropical Africa. AA

PULSES

997

Ashenafi (M). **Growth of *Listeria monocytogenes* in fermenting *tempeh* made of various beans and its inhibition by *Lactobacillus plantarum*.** *Food Microbiology* 8(4): 1991: 303-310

L. monocytogenes grew to a level of 10^6 cfu g^{-1} during fermentation of unacidified horsebean, pea, chickpea and soybean *tempeh*. Inoculation of unacidified beans with *Lactobacillus plantarum* resulted in a complete inhibition of *L. monocytogenes* in fermenting pea, chickpea and soybean *tempeh*. In fermenting horsebean *tempeh* only growth rate retardation was observed. Acidification of the beans during soaking did not show any marked inhibitory effect on the growth of *L. monocytogenes*. Inoculation of acidified cooked beans with *L. plantarum* resulted in a complete inhibition of *L. monocytogenes* in fermenting pea, chickpea and soybean *tempeh*. Only a decreasing *L. monocytogenes* growth rate was noted in fermenting horsebean *tempeh*. The complete or partial inhibition of *L. monocytogenes* is believed to be due to fall in pH, acid production and formation of other inhibitory substances by *L. plantarum*. Since growth of *L. plantarum* does not result in the marked difference in the sesory quality of the product, its use to control undesirable microorganisms may be considered during commercial *tempeh* production. AA

Beans

998

Bonorden (WR) and Swanson (BG). **Thermal stability of black turtle soup bean (*Phaseolus vulgaris*) lectins.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 245-250

A method for determining the thermal stability of porcine thyroglobulin (PTG)-binding lectins in whole black turtle soup beans (*Phaseolus vulgaris* L) is described. The procedure utilises PTG-Sepharose affinity chromatography and the Folin-Ciocalteau protein assay. The majority of lectin activity in whole black turtle soup beans was destroyed by

whereas unsoaked beans required 20 min of heat treatment at 97.8°C. Residual lectin activity was eliminated by thermally processing the presoaked and unsoaked beans for 25 and 50 min at 97.8°C, respectively. Thermal inactivation of the lectin in the whole seed is a biphasic, first-order reaction mechanism. Lectin-rat intestinal epithelial cell binding studies indicated the presence of a second lectin in the BTS albumin protein fraction. The lectinlacked an affinity for PTG and was inactivated by heating unsoaked whole beans for 50 min at 97.8°C. AA

Blackgram

999

Sood (DR), Ram. T. and Dhindsa (KS). **Nutritional and cooking evaluation of blackgram (*Vigna mungo* (L.) Hepper).** *Bulletin of Grain Technology* 29(2): 1991: 99-103

Moisture, protein, methionine, cysteine, cystine, tryptophan, total phenols, Fe, energy, biological value, seed index, seed density, seed vol., hydration capacity, hydration index, swelling capacity, cooking time, pH and electrical conductivity of the solids dispersed in cooking water and water absorption after cooking were analysed for three strains of blackgram, UH 80-7, UH 80-4 and T_9. The nutritional and cooking quality of T_9 strain was superior to others. GS

Cowpeas

1000

Uzogara (SG), Morton (ID) and Daniel (JW). **Effect of water hardness on cooking characteristics of cowpea (*Vigna unguiculata* L. Walp) seeds.** *International Journal of Food Science and Technology* 27(1): 1992: 49-55

Cowpeas were cooked in water made hard (or soft) by the separate addition of similar concn. of certain salts ($CaCl_2$, $MgCl_2$ or $NaHCO_3$). The beans were also cooked in hard tap water and in double distilled water before and after soaking in water. Hard water caused a significant decrease in softness, led to reduced water absorption, and also decreased solids loss in the cooked product, but it increased the cooking time and discolouration of the beans. Hard water also gave rise to a significant ($P < 0.05$) increase in mineral content, but it had less effect on the proximate composition of the cooked products. AA

Fababeans

1001

Sharma (A) and Seghal (S). **Proximate composition and protein fractions of fababean (*Vicia faba*).** *Bulletin of Grain Technology* 29(2): 1991: 104-107

Two var. of *Vicia faba*, VH-131 and WF (White flowered) were analysed for proximate composition and protein fractions. Protein, fat, crude fibre and ash content in VH-131 and WF were 28.65% and 29.22%, 2.15% and 1.80%, 8.8% and 9% and 2.9% and 3.43% respectively. Carbohydrate was more in VH-131. Globulin, albumin and glutenin fractions were 44.57 g and 49.88 g, approx. 14 g in both, 12.21 g and 10.76 g/100 g of protein in VH-131 and WF respectivley. As typical of legumes, prolamines were min. and almost negligible. AA

Mungbeans

1002

Galvez (FCF) and Resurreccion (AVA). **Reliability of the focus group technique in determining the quality characteristics of mungbean [*Vigna radiata* (L.) Wilczec] noodles.** *Journal of Sensory Studies* 7(4): 1992: 315-326

Five focus groups consistently identified list of desirable and undesirable characteristics of dry and cooked noodles. Results indicated that when consumer testing is not desired, focus group technique is a valuable tool. In dry starch noodles, colour, glossiness and transparency but in cooked noodles mouth-feel instead of colour, taste and odour are important. SD

Peas

1003

Kandewade (VL) and Maharaj Narain. **Effect of pre-treatment and drying air temperature on quality of peas dehydrated in fluidized bed dryer.** *Journal of Food Science and Technology (India)* 30(2): 1993: 118-120

Data on pretreatments (pricking and blanching) and drying air temp. (60 - 90°C) on rehydration ratio and sensory characteristics of peas (Variety: 'Akrel') dehydrated in fluidized bed dryers showed that the effect of pricking was more prominent than blanching. Temp. also affected texture and flavour. Drying air temp. of 70 - 80°C with pricking and blanching were found to be the optimum treatments for pea dehydration in fluidized bed. AA

Redgram

1004

Mulimani (VH) and Paramjyothi (S). **Proteinase inhibitors of redgram (*Cajanus cajan*).** *Journal of the Science of Food and Agriculture* 59(2): 1992: 273-275

Proteinase inhibitory activity of 35 var. of redgram (*Cajanus cajan* L) was determined. Chymotrypsin inhibitory activity was more pronounced than trypsin inhibitory activity in all redgram var. tested. Both trypsin and chymotrypsin inhibitory activities were found to be markedly reduced on germination. AA

OILSEEDS AND NUTS

1005

Sindhu Kanya (TC), Nagaraju (T) and Kantharaj Urs (M). **Glucosinolate and lipid composition of newer Indian varieties of mustard and rapeseed.** *Journal of Food Science and Technology (India)* 30(2): 1993: 137-138

Mustard var. contain 64.4 and 89.5 μ moles gluconapin/g dry meal in contrast to 104.2 and 123.3 μ moles/g dry meal in rapeseed var. Sinigrin was present only in mustard and amounted to 7.6 and 10.3 μ moles/g dry meal. Erucic acid was found to be rich in all the var. Iodine values were higher in mustard var. than in 4 var. of rapeseed. AA

Canola

Canola proteins

1006

Ismond (MAH) and Welsh (WD). **Application of new methodology to canola protein isolation.** *Food Chemistry* 45(2): 1992: 125-127

A new method, termed the protein micellar mass procedure is applied to isolate the undenatured canola protein, enhance the amount of protein isolated and eliminate the antinutritional factors. Among 6 different environmental regimes, the medium characterized by pH 5.5, 0.1 M NaCl/0.1 M NaH_2PO_4 was found most suitable for removing antinutritional factors. SD

Groundnuts

1007

Basha (SM). **Soluble sugar composition of peanut seed.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 780-783

To determine the soluble sugar composition of raw peanut (*Arachis hypogaea* L.) seed, sugars were extracted from defatted flours prepared from freeze-dried and cold-stored samples using 80% methanol and fractionated by HPLC. The results showed that except for Altika, all 20 peanut cvs examined contained primarily sucrose followed by glucosamine (tentative), stachyose, and raffinose. During sugar extraction, exposure of samples to heat alone did not cause oligosaccharide breakdown but exposure to acidic sol. increased oligosaccharide breakdown into glucose and fructose. In addition, short-term refrigerated or frozen storage appeared to cause no major changes in soluble sugar composition of peanut seed. Results of this study indicated that the soluble sugar constitutents of peanut seed include primarily sucrose, glucosamine (tentative), raffinose, and stachyose and that other monosaccharides such as glucose and fructose arise as a result of oligosaccharide breakdown during the sample processing and analysis. AA

1008

Jambunathan (R), Gurtu (S), Raghunath (K), Seetha Kannan, Sridhar (R), Dwivedi (SL), Nigam (SN). **Chemical composition and protein quality of newly released groundnut (*Arachis hypogaea* L.) cultivars.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 161-167

Five groundnut cvs developed by the ICRISAT, Patancheru, AP, India and 2 local cvs as controls grown in post-rainy and rainy seasons at Patancheru were analysed for their proximate composition, minerals and trace elements, amino acid composition, true protein digestibility (TD), biological value (BV), net protein utilization (NPU), protein efficiency ratio (PER). Groundnut cvs grown in the post-rainy season showed significantly higher values for protein content, 100-seed mass, Ca, K, Fe and TD than in the rainy season. Starch, sugars, Zn, Mn, BV and NPU were higher in the rainy season than in post-rainy season cvs. Post-rainy season cvs exhibited higher concn. of several essential and non-essential amino acids. BV

Hanshi

1009

Longvah (T) and Deosthale (YG). **Chemical and nutritional studies on hanshi (*Perilla frutescens*), a traditional oilseed from Northeast India.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 781-784

protein (17.0%) and fat (51.7%). The fatty acid profile indicated that perilla oil is rich in polyunsaturated fatty acids, such as linolenic (56.8%) and linoleic (17.6%). The amino acid composition showed that valine was the limiting amino acid of perilla protein. The PER of the seed protein (2.07) was lower than that of casein (2.99), but comparable to common oilseeds. True digestibility of the seed protein (82.6%) was also lower than that of casein (89.3%). AA

Safflower seeds

Safflower seed proteins

1010

Tasneem (R) and Prakash (V). **Effect of aqueous ethanol washing on the physicochemical and functional properties of safflower (*Carthamus tinctorius*) seed proteins.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 237-244

Defatted safflower seed flour was deliganded by repeated extraction with 750 ml litre^{-1} ethanol. This reduced the colour/ligand concn. to > 1% of the original concn. As a result of this the protein concn. increased from 585 to 686 g kg^{-1} after deliganding. The proteins from the deliganded flour comprised 4 protein fractions, as observed from the gel filtration profile and sedimentation velocity pattern. However, the polyacrylamide gel electrophoretic pattern indicated 6 protein bands. Functional properties such as bulk density and water absorption capacity increased after deliganding. The fat absorption, emulsification and foaming properties showed a decreasing trend as a result of deliganding. AA

Soybeans

1011

Snyder (JM), Mounts (TL) and Holloway (RK). **Volatiles from microwave-treated, stored soybeans.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 744-747

Treatment of soybeans with microwave energy for 4-6 min is beneficial to the stability of oil and meal during soybean storage. Treatment of soybeans with microwave energy for 8-10 min can damage oil and meal. BV

1012

Kohyama (K), Yoshida (M) and Nishinari (K). **Rheological study on gelation of soybean 11S protein by glucono-δ-lactone.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 740-744

Dynamic viscoelasticity studies on gelation of soybean 11S protein by glucono-δ-lactone have been done to analyze the gelation process of *tofu*. Observed gelation curves at constant temp. were well approximated by first-order reaction kinetics. The saturated storage modulus depended mainly on the concn. of 11S protein. The saturated modulus was proportional to 3.4th power of 11S concn. The rate constant of the gelation increased with increasing gelling temp. and was mainly governed by the concn. of glucono-δ-lactone. The activation energy of the gelation was calculated to be 1.5×10^{1} kJ/mol from an Arrhenius plot of the rate constants. The latent time at which the shear modulus began to deviate from the baseline became shorter with increasing concn. of glucono-δ-lactone. However, the latent time was not shortened by an increase in protein concn., in contrast to previous findings for many other protein gels. AA

Soy products

1013

Takano (Y), Furihata (K), Yamazaki (S), Okubo (A) and Toda (S). **Identification and composition of low molecular weight carbohydrates in commercial soybean oligosaccharide syrup.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991: 681-683 (Ja)

Low mol. wt. carbohydrates have been preparatively isolated from the soybean oligosaccharide syrup by HPLC using two column systems. Ten carbohydrates including 6 galacto-oligosaccharides and one cyclitol were clearly identified by ^{13}C-NMR (500 MHz). Composition of carbohydrates was estimated by comparing peak area of the HPLC peaks: stachyose (21.9%), raffinose (5.8%), manninotriose (5.4%), melibiose (1.1%), galactopinitol A (2.6%), galactopinitol B (2.4%), sucrose (34.6%), glucose (7.2%), fructose (8.3%) and pinitol (5.5%). The content of the growth activator of bifidobacteria (stachyose, raffinose, manninotriose and melibiose) was about 34%. AA

Shiro-shoyu

1014

Yamamoto (Y), Kakegawa (R), Takahashi (T), Higashi (K) and Yoshii (H). **Studies on making of shiro-shoyu. Part I. Utilization of soya lactic acid bacteria for shiro-shoyu making.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991: 663-667 (Ja)

(Nippon Shokuhin Kogyo Gakkaishi) 38(8): 1991: 663-667 (Ja)

The utilization of soya lactic acid bacteria (*Pediococcus halophilus*) was investigated to improve the quality and colour of Shiro-shoyu (extremely light coloured soy sauce). The colour-lightening strains lowered the oxidation-reduction potentials of Shiro-shoyu moromi-juice (MJ) medium during their growth and suppressed the browning of the medium. A colour-lightening strain C-6-8 grew vigorously (viable cell of 10^8/ml) in the Shiro-shoyu MJ medium. In the incubation at 21 - 30°C, the growth of strain C-6-8 slowed down with lowering temp., while at the lower temp. the period of fermentation were longer than that at the higher temp. In Shiro-shoyu moromi (mash) inoculated with strain C-6-8, lactic acid fermentation was continued about 2 wks at 22°C, and darkening phenomenon of moromi was suppressed during the fermentation. The contents of total N and L-glutamic acid of Shiro-shoyu made by inoculation of strain C-6-8 were slightly lower than that of non inoculated. However, production of a large quantity of lactic acid and acetic acid resulted low pH and high buffer action. These results suggested that the inoculation of soya lactic acid bacteria of Shiro-shoyu moromi were useful to improve the taste and colour of Shiro-shoyu. AA

Soy flour

1015

Jonnalagadda (SS), Sabharwal (P), Pratt (CA) and Barbeau (W). **The effect of dry heat on the bioavailability of iron in soy flour.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991: 944-948

Bioavailability of Fe in soy flour was investigated by the Hemoglobin Regeneration Efficiency (HRE) procedure in 50 three-month-old Sprague-Dawley rats. Rats weighing 250 plus or minus 7 g and with a mean hemoglobin level of 12.9 g/dl were randomly assigned to one of 5 treatment groups: baseline (BL), unheated soy flour (UH), soy flour heated at 225°F for either 10 min (H10), 30 min (H30), or 120 min (H120). The animals were fed diets (46 p.p.m. Fe) containing soy flour for 21 days. HREs of UH, H10, H30 and H120 diets were 17.6, 16.8, 17.7 and 16.8% respectively. Apparent Fe absorption from teh UH, H10, H30 and H120 dites was 94.7, 94.3, 93.9 and 94.3%, respectively. Serum Fe was significantly lower ($p < 0.001$) and total Fe binding capacity was significantly higher ($p < 0.001$) in rats fed the H120 diet. Fe concn. in the liver, spleen, heart and kidney were significantly lower in rats fed H30 or H120 diets. These results suggest that prolonged heating of soy flour may reduce Fe bioavailability and result in depletion in Fe stores. AA

Soy rabadi

1016

Grewal (RB) and Chauhan (BM). **Microbiological and available carbohydrate profile of soy *rabadi* - an indigenous fermented food.** *Indian Journal of Microbiology* 32(4): 1992: 457-461

Rabadi, an indigenous fermented food, was prepared from soybean. The grains were soaked, dehulled, autoclaved, mixed with curd prepared from skim milk powder and the mixture fermented at 25, 30 and 35°C for 12, 24 and 48 h. The microorganisms in the unfermented *rabadi* mixture comprised of lactobacilli, followed by yeast and coliforms at all the temp. Fungi were not detected. The pH decreased and titratable acidity increased as fermentation advanced. Total, reducing and non-reducing sugars as well as starch diminished with an increase in the period of fermentation at all the temp. Growth of lactobacilli depended on the total soluble sugar content and pH of the fermented product. AA

Tempeh

1017

Ashenafi (M) and Busse (M). **Growth of *Staphylococcus aureus* in fermenting *tempeh* made from various beans and its inhibition by *Lactobacillus plantarum*.** *International Journal of Food Science and Technology* 27(1): 1992: 81-86

In fermenting *tempeh* made from non-acid-soaked horsebean, pea, and soybean *Staphylococcus aureus* grew rapidly to a final count of 10^8 cfu.g^{-1} or more, but growth was less when chickpea was used. Inoculation of the cooked beans with *Lb. plantarum* markedly decreased *S. aureus* growth rate and the final count in non-acid-soaked horsebean and pea *tempeh*, strongly retarded growth in chickpea-, and completely inhibited growth in soybean-*tempeh*. Acid soaking the beans resulted in lower *S. aureus* growth, and inoculation with *Lb. plantarum* completely inhibited it in soybean and reduced the counts in the other products to < 10^4 cfu.g^{-1}. Acidity, pH and other substances produced by *Lb. plantarum* are believed to inhibit *S. aureus* in fermenting *tempeh*. Inoculation of beans with *Lb. plantarum* may be used to control *S. aureus* growth and enterotoxin production during commercial scale *tempeh* production. AA

1018

Bargale (PC) and Krishna Jha. **Changes in the instrumental texture profile of pasteurised *tofu* (soy *paneer*) during storage.** *Indian Journal of Dairy Science* 45(8): 1992: 429-431

Pasteurised *tofu* during storage revealed that an increase in the storage period some of the textural parameters like hardness, chewiness and gumminess increased significantly and springiness and cohesiveness remained unchanged. The prediction equations developed could be used for prediction of these parameters at desired period of storage. SRA

1019

Tuitemwong (K) and Fung (DYC). **Microbiological study of *tofu*.** *Journal of Food Protection* 54(3): 1991: 212-216

The microbiological qualities of *tofu* juice and cake were studied. 7 brands of *tofu* from 4 grocery stores were tested, at day 1 and after 30 days of storage in a refrigerator. The microbial load at day 1 was different from brand to brand, but cell counts in juice and cake of the same brand were correlated. The number of cells observed at day 30 was different from bran to bran but was related to the initial cell count. The pH had a great effect on the type of contaminating miroorganisms present. All brands spoiled after 30 days of storage at 7°C; 112 isolates from both the fresh juice and cake at day 1 and at day 30 were obtained. The most common gram-positive organisms isolated were *Streptococcus* sp., *Pediococcus* sp., and *Lactobacillus* sp., and the most common gram-negative bacteria were *Pseudomonas putida*, *P. aeruginosa Enterobacter agglomerans* and *E. cloacae*. AA

TUBERS AND VEGETABLES

Carrots

1020

Sood (DR), Tek Ram, Dhindsa (KS) and Partap (PS). **Carbohydrates and pigment assays in forty one genotypes of carrot (*Daucus carota* L).** *Journal of Food Science and Technology (India)* 30(2): 1993: 145-147

Considerable variation has been observed in total solids, edible part, moisture, total sugars, reducing sugars, non-reducing sugars, total fructose, total carotenoids, anthocyanins, xanthophyll and lycopene contents in 41 carrot genotypes. AA

Cassava

Cassava starch

1021

Nellaiah (H) and Gunasekaran (P). **Ethanol production from cassava starch hydrolysate by immobilized *Zymomonas mobilis*.** *Indian Journal of Microbiology* 32(4): 1992: 435-442

Batch fermentations of cassava starch hydrolysate (CSH, 150 g/l reducing sugars) by immobilized cells of *Z. mobilis* showed that a max. ethanol concn. of 59 g/l and productivity of 3.57 g/l/h could be obtained in 20 h while the final ethanol concn. obtained with free cells was 66 g/l with a productivity of 2.75 g/l/h in 24 h. Semi-continuous fermentation of CSH using immobilized cells reduced the fermentation time from 20 h to 12 h with an increased volumetric productivity of ethanol from 2.95 to about 4.85 g/l/h. The immobilized cells were stable for 7 cycles. Continuous production of ethanol using immobilized cells in packed-bed reactor at a flow rate of 59/ml resulted in the production of 51.6 g/l of ethanol with a volumetric productivity of 77 g/l/h for a period of 30 days. GS

Taro

1022

Maga (JA). **Taro: Composition and food uses.** *Food Reviews International* 8(3): 1992: 443-473

The history, nomenclature, composition (proximate composition, protein/amino acid composition, lipids/fatty acids, starch, sugars, minerals, vitamins, organic acids, pigments, sterols, enzymes, acidity) of taro, compositional changes associated with taro production/processing/preparation, flavour properties, taro browning and crystalline taro, aflatoxin potential, food uses (poi, dehydrated taro chips, extruded taro) are reviewed based on scientific literature. 69 references. SRA

Tubers

Potatoes

1023

Reddy (GV) and Das (H). **Kinetics of deep-fat-frying of potato and optimization of process variables.** *Journal of Food Science and Technology (India)* 30(2): 1993: 105-108

Effects of deep-fat-frying time, temp. and thickness of potato slices on oil absorption, moisture content and colour of chips have been studied. The loss of reducing sugars was found to have an average

and colour of chips have been studied. The loss of reducing sugars was found to have an average diffusivity of 5.06 x 10^{-9} m^2/s in case of blanching of 1.5 and 2 mm thick slices in boiling water. Colour development followed first order reaction kinetics with a Q_{10} value of 1.39 and 52.27 kJ/kg mole activation energy. Multiple regression equations were developed for moisture, oil and colour values in the final product as a function of frying time, oil temp. and thickness of slice. Use of linear programming technique yielded 220 - 222 sec frying time., 145 - 146°C oil temp. and 2 mm thickness of slice as optimum parameters. AA

Sweet potatoes

1024

Ma (S), Silva (JL), Hearnsberger (JO) and Garner (JOJr). **Prevention of enzymatic darkening in frozen sweet potatoes (*Ipomoea batatas* (L.) Lam.) by water blanching: Relationship among darkening, phenols, and polyphenol oxidase activity.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 864-867

Enzymatic darkening in sweet potato (*Ipomoea batatas* (L.) Lam.) is a result of phenol oxidation catalyzed by polyphenol oxidase (PPO). Water blanching prevents darkening in frozen sweet potatoes by significantly decreasing the PPO activity but does not reduce phenol levels. The effect of curing on darkening was indirect and cv dependent. Compared to Centennial, the cv Jewel contained lower phenols but higher PPO activity. Generally, a blanch treatment at 100°C for 3 min or at 94°C for 5 min is required to produce products with minimal darkening. The results suggest that the phenol concn. should be used as an indicator for the potential enzymatic darkening in green sweet potatoes, whereas the residual PPO activity is a better predictor of darkening in the blanched or processed products. AA

Vegetables

1025

Wu (Y), Perry (AK) and Klein (BP). **Vitamin C and β-carotene in fresh and frozen green beans and broccoli in a simulated system.** *Journal of Food Quality* 15(2): 1992: 87-96

Ascorbic acid (AA) in green beans decreased during refrigerated storage and in broccoli significantly increased for upto 7 days. Approx. 40% of AA loss was found in broccoli due to blanching. AA of fresh-frozen green beans stored at -20°C for 16 wks was about twice that in retail fresh market samples while that of broccoli was only half. β-carotene content of green beans and broccoli did not change during either the retail market simulation of frozen storage and did not differ from that of fresh. SD

Broccoli

1026

Hansen (M), Buttery (RG), Stern (DJ), Cantwell (MI) and Ling (LC). **Broccoli storage under low-oxygen atmosphere: Identification of higher boiling volatiles.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 850-852

Volatiles were isolated from broccoli stored under controlled atm. containing different levels of N_2, O_2, and CO_2. The volatiles were analyzed by capillary GLC and MS. The presence of the previously identified methanethiol, ethanol, ethyl acetate, and dimethyl disulphide in low oxygen stored broccoli was confirmed. Additional compounds, identified in the present work, increasing under these low oxygen conditions included 3-hydroxybutan-2-one, methyl thiocyanate, hexanal, (E)-2-hexanal, 3-methylbutanol, dimethyl trisulphide, and 21 other compounds. Major compounds include methanethional, ethanol, ethyl acetate, 3-hydroxybutan-2-one, and methyl thiocyanate. The combination of threshold and concn. data indicated that the major contributors to the odour of the objectionable samples included methanethiol, dimethyl trisulphide, and β-ionone. AA

Tomatoes

1027

Thiagu (R), Onwuzulu (OC) and Ramana (KVR). **A non-destructive measurement of pigments of whole tomato by light reflectance technique.** *Journal of Food Science and Technology (India)* 30(2): 1993: 92-96

A simple non-destructive method for estimating pigment content of tomato during ripening is described. Tomatoes sorted out subjectively into 6 ripening stages, from mature-green to over-ripe, were subjected to light reflectance measurements using a tristimulus photovoltic colour instrument and also analysed for lycopene, chlorophyll and β-carotene contents. Simple linear coeff. of correlations between pigment values and 10 reflectance parameters viz., lightness (L), redness (a), yellowness (b), hue (a/b), hue angle {$\theta = \tan^{-1}(b/a)$}, chroma (ΔC), total colour difference (ΔE), a/L, arc length {θ^{*} sqr ($a^{-2} + b^{2}$)} and tomato colour (2000^{*} Cosθ/L) were determined and suitable regression equations fitted to estimate lycopene, chlorophyll and β-carotene contents of tomatoes, using the best linear/non-linear function. AA

Kalra (R) and Nirankar Nath. **Effect of variety on morphological and physico-chemical characteristics of tomatoes.** *Beverage and Food World* 19(4); 1992; 26-27

Suitability of 5 commercial tomato var. (Pant Bahar, Pusa Ruby, Pant T-3, Pant T-4 and Pant T-5) were studied for processing. All the var. showed symmetrical shape with visible differences in their surface colour and appearance; their wt., vol., dia., sp. gr. and flesh thickness differred significantly. Pant Bahar and Pant T-5 gave highest juice yields of 81.3 and 83.0% respectively, sp. gr. of whole fruits was close to that of its juice. TSS was 4.1% in Pusa Ruby and 4.5% in Pant Tt-5. Pusa Ruby contained max. lycopene (1.74 mg/100 g), ascorbic acid 22.50 mg/100 g) and protein (0.34%). This study shows that var. Pusa Ruby and Pant T-5 were overall superior to other var. for processing due to their higher TSS, better colour and good juice yield. BV

FRUITS

Artichokes

1029

Rodrigo (M), Garcia (MG), Ramirez (L), Martinez (A), Giner (V), Safon (J). **Physical texture as an indicator of processing conditions for canning low-acid artichoke hearts.** *International Journal of Food Science and Technology* 27(1); 1992; 41-48

Kramer shear cell measures of texture of artichoke hearts were used to establish thermal loss parameters. A D_{121} = 25.5 min and a z = 27°C for texture were obtained, with a high correlation between texture and treatment time. Max. conservation of texture, in canned low-acid artichoke hearts in 0.5 kg cans (71.5 x 117 mm) whilst still ensuring microbiological stability, was obtained by heating at 121°C for 15 min. AA

Bananas

1030

Thomas (P) and Janave (MT). **Effect of temperature on chlorophyllase activity, chlorophyll degradation and carotenoids of Cavendish bananas during ripening.** *International Journal of Food Science and Technology* 27(1); 1992; 57-63

Changes in chlorphyllase activity, chlorophyll and carotenoid content of Giant Cavendish banana fruit peel during ripening were measured at tropical temp. (30 - 34°C) and at 20°C to relate them to the greenish and yellow colours of the fruit ripened at these temp. At 30 - 34°C bananas remained green on ripening due to incomplete chlorophyll degradation while at 20°C complete degreening occurred and fruits turned yellow. Peel total carotenoid content remained constant during ripening and did not change with temp. Free xanthophylls decreased while xanthophyll esters increased on ripening. Chlorophyllase activity increased during ripening and paralleled the respiratory climacteric, although activity was not consistently related to the differential degradation of chlorophyll at these temp. Exogenous application of ethylene and ethrel accelerated ripening, but had no effect on chlorophyllase levels, chlorophyll degradation and carotenoid content of bananas ripened at either 30 - 34°C or at 20°C. AA

Guava

1031

Chyau (C-C), Chen (S-Y) and Wu (C-M). **Differences of volatile and nonvolatile constituents between mature and ripe guava (*Psidium guajava* Linn) fruits.** *Journal of Agricultural and Food Chemistry* 40(5); 1992; 846-849

During the ripening of guava fruits, the contents of total pectin, total sugars, reducing sugars, and acidity dropped obviously from the mature to the ripe stage, but the Brix-acid ratio increased inversely. Volatile constituents of mature and ripe guava fruits were identified by GC, GC/MS, and GC/FT-IR. A total of 34 components were identified, in which 17 components were further identified by authentic compounds. In quantitative distribution, total amounts of 134 mg/kg of mature fruit and 93 mg/kg of ripe fruit were determined. The major constituents in mature fruit were 1,8-cineole, (E)-2-hexenal, and (E)-3-hexenal. Ethyl hexanoate and (Z)-3-hexenyl acetate were the major volatile components of ripe fruit. AA

Luffa tuberosa

1032

Kulkarni (CY), Bharathi (P) and Patil (CV). **Antimicrobial activity of *Luffa tuberosa* (Roxb).** *Indian Journal of Microbiology* 32(4); 1992; 493-495

L. tuberosa (Karchikai), a bitter fruit, 2-4 cm in length, was analysed for its antimicrobial activity which was due to the presence of natural glycoside like saponin. Processing improved the antimicrobial activity of the fresh fruit or the extracts. Roasting with oil increased the inhibition. The presence of saponin was established by the heavy foam formation (75 ml/100 g fruit or 25 ml fruit juice). GS

Mangoes

1033

Awasthi (MD). **Decontamination of insecticide residues on mango by washing and peeling.** *Journal of Food Science and Technology (India)* 30(2); 1993; 132-133

The insecticide residues on mango fruits, resulting from plant protection sprays, were reduced to 66 - 68% for dimethoate and fenthion as against 21 - 27% for fenvalerate and cypermethrin simply by washing treatment. The peeling-off the fruit pericarp was found to dislodge 100% residues in all the cases. AA

1034

Khurdiya (DS). **Composition and quality of nectar prepared from blended pulps of *Amrapali* and *Totapuri* mangoes.** *Journal of Food Science and Technology (India)* 30(2); 1993; 139-140

Nectar prepared from the pulps of *Totapuri* and *Amrapali* at the ratio of 50:50, was superior in objective colour, carotenoid contents, viscosity and sensory quality, to the nectars prepared from either *Totapuri* pulp alone or the blend with *Amrapali* in the ratio of 75:25. AA

Peaches

1035

Gonzalez (AR), Mauromoustakos (A), Prokakis (G) and Aselage (J). **Influence of year, cultivar and fruit maturity on quality of peach puree.** *Journal of Food Quality* 15(2); 1992; 97-109

A 3 yr study showed that pH and soluble solid/acid ratio increased while acidity and hue angle decreased and soluble solid had small or no increase as the first reached advanced stages of maturity. All these parameters fitted in linear regression accounted for 95% of the variability for maturity and cv. The results indicated that fruit maturity had strong relative importance than yr and cv. SD

1036

Vergano (PJ), Testin (RF), Choudhari (AC) and Newall (WCJr). **Peach vibration bruising: The effect of paper and plastic films between peaches.** *Journal of Food Quality* 15(3); 1992; 183-197

Kinetic coeff. of friction (KCOF) values for peaches (cv. Candor, Rio-Oso-Gem, Redhaven, Jefferson and Sun Prince) were determined by using a modification of ASTM D 1894. The hypothesis show that the amount of vibration bruising is proportional to KCOF of peaches in contact with packaging material tested. Lower KCOF values only corresponded to less bruising. The KCOF values were 0.7 for peach-to-peach; 0.4 for peach-to-paper and 0.2 for peach-to-polypropylene contacts. KCOF values were independent of cv. and maturity. KCOF value for peach-to-polypropylene contact was found to be a function of antiblock additives in the particular film used. SD

CONFECTIONERY, STARCH AND SUGAR

Sugars

1037

Wilson (J). **Brewing sugars: The versatile adjuncts.** *Food Manufacture* 67(9); 1992; 30-32, 34

Review covers the manufacturing processes, carbohydrates, fermentation rates, the advantages, high gravity brewing, increasing fermentable sugar, low alcohol beers, demineralised syrups, speciality brewing sugars and caramel colours. 15 references. SRA

BAKERY PRODUCTS

1038

Hemantha Kumar (NG), Chengappa (PG) and Gaur (MK). **Pattern of expenditure and opinion of consumers on bakery products.** *Indian Baker* 23(1); 1992; 13-15

A consumer survey on bakery products with 75 families belonging to different monthly income level upto Rs 5000 and above indicated that on an av. 6.5% of their income was spent on bakery products prefering them for their nutritional and convenience aspects. SD

1039

Hemanta Kumar (NG), Chengappa (PG) and Ravi (PC). **Investment and resource use efficiency in bakery production.** *Indian Baker* 23(1); 1992; 18-21

Biscuit, cake, bun and bread bring the highest net returns and the investment in bakery is worthwhile. Raw material cost, labour and depreciation influence the level of bakery production. Use of electric ovens compared to fire wood ovens can be regulated for higher fuel efficiency in large bakeries. SD

1040

Arya (SS). **Convenience foods - emerging scenario.** *Indian Food Industry* 11(4): 1992: 31-41

The paper emphasises the factors governing the quality and the technological constraints encountered in large scale production and marketing of convenience foods such as shelf stable fried products (*Shakarparas* and *namkeen*; fried products from Bengal gram; fried products from rice and legumes - *chakli*, *murukku*, *tengolal*, *muchorai* and *kodbale*; fried dhals); most fried products (*somosha*, *cutlets*, *vada*, *pakora*, *kachori*, *bhajl*); popped or puffed cereals (*kheel*, *khoj*, *aralu*, *nelpuri*); expanded cereals (*murmura*, *puri*, *muri*); beaten rice (*poha*, *avalakki*, *Chivda*); extruded foods (extruded pellets, ready-to-eat expanded products, corn and tortilla chips); fermented products (*idli*, *dosai*); traditional sweets (*chikki*, *gajjak*, *laddu*, *boondi*, *jilebi imarti* and *jhangiri*); papads; instant mixes based on chemical leavening (*gulab jamun*, cake, pancake, *dosai*, *idli*); instant mixes based on precooked dehydrated products (*pulav*, *khichdi*, *bisibelebhat*, curried dhal, rice, peas, curried *chholay*, *sambhar*, *rasam*, *dalia*, *rawa idli*, *halwa* and *upma* mixes); ready-to-eat products stabilised by antimycotic agents (*chapati*, *parotha* and *poori*); retort pouch foods (stuffed *parothas*); canned convenience foods; breakfast cereals (*dalia*, rolled oats, cereal flakes); fruit and vegetable based convenience foods. CSA

1041

Bhupinder Singh, Amarkeet Kaur, Minhas (KS) and Sidhu (JS). **Role of milk and products in bakery goods.** *Beverage and Food World* 19(4): 1992: 15-16

Milk products incorporation in bakery formulas significantly enhances flavour, aroma, eating quality and nutritional values, in addition to improving water absorption, dough strength, crust colour, tenderness, loaf vol., internal crumb characteristics, and shelf-life of bakery products. Milk solids significantly improve the protein quality of bakery goods by supplying lysine and tryptophan essential amino acids. Milk products also improve vital mineral content of bakery goods. The following aspects are included: types of milk and milk products, role of milk, role of non-fat dry milk, whey products, role of whey and whey components, role of butter milk powder and butter fat. BV

Bread

1042

Srivastava (AK) and Haridas Roe. **Effect of using different sources of milk products on the quality of bread.** *Journal of Food Science and Technology (India)* 30(2): 1993: 109-113

Studies were carried out to determine the effect of different milk products, such as skimmed milk powder, whole milk powder, whole milk and condensed milk on the quality of bread. All these milk products, in general, reduced the farinograph water absorption, increased the farinograph dough stability and made the dough more stiff. Incorporation of any type of milk product at 6.0% level (on dry basis) lowered the loaf vol. by 4.8 to 12.4%, hardened the texture, and made the grain coarser. The quality of milk bread could be improved by using 7.5% sugar, 4.0% fat and either a mixture of 15 p.p.m. potassium bromate and 100 p.p.m. ascorbic acid, or 0.5% of di-acetyl tartaric acid ester of monoglyceride along with 100 p.p.m. ascorbic acid. The above formulation improved the loaf vol. (445 to 559 cc) and crumb texture of the milk bread. The studies indicated that sterilized whole milk, which is less expensive than the dried or condensed milk, could be effectively used in milk bread formulation. AA

1043

Sidhu (JS), Bajaj (M), Kaur (A) and Singh (B). **Studies on the development of variety bread formulations.** *Bulletin of Grain Technology* 29(2): 1991: 93-98

The technology for the production of a few speciality breads like low-sodium breads, high fibre breads, sunflower kernal breads using different types of ingredients was developed. The breads showed desirable sensory characteristics, and superior nutritional quality with respect to protein, fat, ash, fibre and mineral content. GS

1044

Balakrishnan (N). **Soft bread from hard wheat.** *Indian Baker* 23(1): 1992: 27-29

Consumer seeks softness in bread as an index of freshness. The author reviews the part played by the factors such as hardness and composition of wheat, milling, incorporation of additives, improvers, enzymes, chemicals, flour quality and composition, dough quality, mixing, baking, wrapping and storage. SD

1045

Sinha (LK), Singh (G) and Ponte (GJ). **Baking and nutritional characteristics of soy-fortified bread.** *Indian Baker* 23(1): 1992: 31-34

Soy flour addition increased mixing tolerance index, water absorption but decreased the dough stability and mixing time. Increased level of fortification decreased specific vol. baking characteristics but

increased load value (textural analysis) which could be improved by addition of sodium steroyl-2. Soy fortification at 12% produced acceptable and nutritionally improved bread. SD

Doughs

1046

Venkateswara Rao (G) and Haridas Rao (P). **Methods for determining rheological characteristics of doughs: A critical evaluation.** *Journal of Food Science and Technology (India)* 30(2): 1993: 77-87

Rheological characteristics of doughs are of vital importance to bakery industry in predicting processing characteristics of dough and the quality of the end products. These also play a role in quality control programme and establishment of specifications for ingredients and the final products. Consequently, the reliability of the methods used for determining the rheological characteristics of dough assume vital importance. These methods are, therefore, critically analyzed and their limitations are pin-pointed. Use of computerized instruments is advantageous for more accurate, rapid and reproducible calculations of the curve parameters. AA

Nan

1047

Rahim (A), Vatsala (CN) and Shrupalekar (SR). **Development of a laboratory method for preparation of *Nan*.** *Journal of Food Science and Technology (India)* 30(2): 1993: 114-117

A lab. method for preparation of an Indian traditional fermented food - *nan* has been developed, based on a questionnaire survey and evaluation of the dough and the *nan* from hotels. Research water absorption meter (RWAM) has been adapted for determining *nan* dough water absorption (NWA) to arrive at the desired dough consistency, expressed as the dough extrusion time in the range of 65 - 76 sec. Conditions have been optimised for (i) preparation of the dough based on refined wheat flour (*maida*), curd/yoghurt, milk, table salt, egg, fat, sugar, food grade sodium bicarbonate and water equivalent to NWA, (ii) fermentation and sheeting of the dough and (iii) baking of *nan* in a gas *tandoor* (oven). AA

Pasta

1048

Glass (KA) and Doyle (MP). **Relationship between water activity of fresh pasta and toxin production by proteolytic *Clostridium botulinum*.** *Journal of Food Protection* 54(3): 1991: 162-165

Four types of fresh pasta (meat- or cheese-filled tortellini and flat noodle linguine or fettucine) were prepared with different a_w, inoculated with proteolytic *Clostridium botulinum* spores, packaged under a modified atm., and stored at either 4 or 30°C for 8 to 10 wks. Products were assayed for botulinal toxin at appropriate sampling times. No toxin was detected in any fresh pasta held at 4°C for up to 8 wks. However, toxin was detected in meat tortellini with a_w of 0.99 and 0.95 at 2 and 6 wks, respectively, when held at 30°C. Toxin was not detected in meat tortellini with an a_w of 0.94 or below held at 30°C for 10 wks. Toxin was produced at 2 wks in linguine at a_w 0.96 and held at 30°C, whereas no linguine or fettucine at a_w 0.93 or 0.95 and held at 30°C was toxic during 10 or 8 wks, respectively. The a_w of fresh pasta is a principal factor in preventing botulinal toxin production by proteolytic *C. botulinum* in temp.-abused products. A survey of commercially available fresh pasta revealed that most flat noodles were below the a_w limit for botulinal toxin production, whereas most of the filled pasta had a_w values which permitted toxin production if temp. abuse occurred. AA

MILK AND DAIRY PRODUCTS

1049

Sarkar (S) and Misra (SK). **Automated instrumentation for rapid quality assessment by the dairy industry.** *Indian Dairyman* 44(10): 1992: 477-484

Reports several automatic and semi-automatic instruments for quick and correct analysis and quality control of milk and milk products, since the conventional methods for examining raw milk are time consuming and laborious. The instruments are stomacher, automated pipettes and dilutors, automated plater, streaker and inoculator, colony counters and dynastainer. The new methods used today in the dairy industry are electrical methods, microscopic methods and quantitative methods such as Deft method, Bactoscan method, ATPase method, turbidimetric method, Limulus Lysate method, ElISA technique and infrared spectroscopic method. For bacteriological analysis of raw milk, the ATP-F test was the most rapid one. GS

1050

Patel (AA) and Prasad (SR). **Removal of radioactive contaminants from milk.** *Indian Dairyman* 44(12): 1992: 572-577

Processing of milk contaminated with radioactive isotopes such as strontium-89 and -90, iodine-131 and caesium-134 and -137, and methods of prevention and decontamination such as ageing, partioning, treatment with ion exchangers; electrodialysis and the ultrafiltration are discussed. GS

1051

Arvind Raman and Jain (KK). **Dairying potential in Jalandhar district of Punjab.** *Indian Dairyman* 44(12): 1992: 578-583

1052

Shahani (KM). **Biotechnological applications in the dairy industry.** *Indian Dairyman* 45(1): 1993: 7-12

Principles of artificial insemination; growing of better fodder crops by selection of seed stocks; selection and growth of better cultures for the production of dahi and cheese; and advances in embryo transfer technology in the dairy industry are discussed. GS

1053

Cotton (LN) and White (CH). ***Listeria monocytogenes*, *Yersinia enterocolitica*, and *Salmonella* in dairy plant environments.** *Journal of Dairy Science* 75(1): 1992: 51-57

In order to determine the presence of the 3 environmental pathogens in dairy plants, 6 milk and 4 ice cream plants in a three state area were sampled. A total of 353 environmental samples were taken over 3 replications. Bacterial counts were performed on the environmental samples for chi-square analysis. *Salmonella* spp. were not isolated from any of the environmental samples. *L. monocytogenes* was isolated from 6.5% of the environmental samples. *Listeria* spp. other than *L. monocytogenes* were isolated from 9.3% of the environmental samples. The presence of *Y. enterocolitica* was significantly related to high bacterial counts for 6 microbiological tests. The presence of *L. monocytogenes* was not related to high bacterial counts. AA

1054

Shirai (K), Gutierrez-Duran (M), Marshall (VMF), Revoh-Moiseev (S) and Garcia-Garibay (M). **Production of a yoghurt-like product from plant foodstuffs and whey, sensory evaluation and physical attributes.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 205-210

A mixed substrate composed of soya milk, oat flour and dried cheese whey (820, 110 and 70 g kg^{-1} respectively) was heat treated (80°C, 20 min) and fermented using 2 different yoghurt starters. Sensory evaluation was conducted in order to get the basic flavour profile and to assess the acceptability of the product. Unfermented mixed substrate and fermented milk were used as references. Two yoghurt starter combinations were used. Some additives such as sugar and Ca were also assessed. The addition of an equal wt. of milk to the mixed substrate, and flavours such as strawberry jam or honey, were tried as well. Acceptability of the mixed substrate was increased by fermentation and added sugar, milk and/or flavours. A suitable combination of strains was very important to get good acceptability of the fermented product. Colour and syneresis were also evaluated. Heat treatment had very little influence on the colour of the mixed substrate. The mixturewas less white and a little less green than milk. Syneresis was lower than that of a yoghurt made from milk with 145 g $litre^{-1}$ total solids. AA

1055

Shirai (K), Pedraza (G), Gutierrez-Duran (M), Marshall (VME), Revah-Moiseev (S), Garcia-Garibay (M). **Production of a yoghurt-like product from plant foodstuffs and whey. Substrate preparations and fermentation.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 199-204

A mixed substrate composed of soya milk, oat flour and dried cheese whey (82, 11 and 7% respectively) had a content of lactose and protein similar to that of milk used for yoghurt manufacture. Heat treatment for 20 min at 80°C resulted in a viscosity similar to that of yoghurt whilst removing coliform and mesophilic aerobic bacteria, moulds and yeasts. Fermentation with traditional yoghurt bacteria did not increase viscosity further, and the final product had similar acidity and texture to yoghurt. Acid development, carbohydrate consumption, proteolysis and starters counts were followed during fermentation. The fermentation profile of the mixed substrate was very similar to that of milk. AA

Milk

1056

Kansal (VK). **Lactose in human health.** *Indian Dairyman* 44(10): 1992: 497-500

Lactose, the milk sugar is important in infant nutrition as a source of energy. It helps Ca absorption by small intestine and promotes the mineral utilization. It is useful as a therapeutic/dietetic sugar and promoter of the growth of acidophilic bacteria. In the event of metabolic diseases caused by lactose intolerance

and the metabolic disorders of galactose (galactosaemia), diet should be free of lactose. GS

1057

Vijayendra (SVN) and Gupta (RC). **Therapeutic importance of bifidobacteria and *Lactobacillus acidophilus* in fermented milks.** *Indian Dairyman* 44(12): 1992: 595-599

Reports the use of the intestinal strains (*Bifidobacterium* and *L. acidophilus* in the preparation of fermented milk products like dahi, yoghurt and lassi and their beneficial role with respect to antimicrobial activity, anticarcinogenic activity, anticholesterolemic effect, alleviation of lactose intolerance and vitamin synthesis. GS

1058

Doi (T), Satoh (K), Kanzaki (M) and Matsumoto (K). **An investigation to determine lactose by using oxidation-reduction reaction and its application to some kinds of milk and milk products.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(7): 1991: 575-580 (Ja)

1059

Bastian (ED), Brown (RJ) and Ernstrom (CA). **Plasmin activity in milk coagulation.** *Journal of Dairy Science* 74(11): 1991: 3677-3685

Monthly milk samples were collected from 19 Holstein and 19 Jersey cows in separate herds during 10 months lactations (380 total samples). Effects of breed-herd, lactation number, season, and stage of lactation and the interactions of these parameters on plasmin, plasminogen, and milk-clotting measurements were determined. Lactation number had the greatest influence on plasmin activity, which increased during lactation but was not influenced by breed-herd, pH, protein, or fat. Stage of lactation and season were the only factors that influenced plasminogen. Percentage of plasminogen activated was highest during late lactation, in milk from fourth and later lactation cows, and during fall and winter. Plasmin activity did not influence milk-clotting parameters. Clotting time decreased as pH decreased and as protein and fat increased. Increased protein and fat improved firming rate of curd. Milk samples collected in the fall had the highest firming rates, and stage of lactation did not influence firming rate. Lower pH, higher protein, and higher fat decreased cutting time. Increased protein and fat improved curd firmness. Jersey herd milk had firmer curd than Holstein herd milk. Lactation number and stage of lactation did not influence curd firmness. AA

1060

El-Gazzar (FE), Bhoner (HF) and Marth (EH). **Antagonism between *Listeria monocytogenes* and lactococci during fermentation of products from ultrafiltered skim milk.** *Journal of Dairy Science* 75(1): 1992: 43-50

Tyndallized samples of unfiltered skim milk and retentate (conc. five-fold or twofold by vol.) and permeate from UF skim milk were inoculated with 5.5×10^3 to 1.5×10^5 cfu/ml of *L. monocytogenes* strains California or V7 together with 4×10^7 to 2.3×10^8 cfu/ml of mesophilic lactic acid bacteria. Numbers of *L. monocytogenes* (McBride Listeria agar) and lactic acid bacteria (all purpose Tween agar) were determined after 0, 6, 12, 24, 30 and 36 h of incubation at 30°C. Lactic acid bacteria significantly inhibited or inactivated *L. monocytogenes* in all 3 products. Inactivation was greater in permeate (6.77 orders of magnitude) than in unfiltered skim milk (3.67 orders of magnitude) or in retentate (4.21 orders of magnitude). Degree of inactivation in retentate was related to the extent of concn. Inactivation was not complete, and *L. monocytogenes* survived in these products during fermentation for up to 36 h. When fermented products were refrigerated (4°C), *L. monocytogenes* survived for 4 to 6 wk in skim milk, 3 to 5 wk in retentate, and 1 wk in permeate. At refrigeration temp., length of survival was dependent on type of product and strain of the pathogen. AA

1061

Chen (ZY) and Nawar (WW). **Prooxidative and antioxidative effects of phospholipids on milk fat.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991: 938-940

The effects of dipalmitoylphosphatidylethanolamine (DPE) and dipalmitoylphosphatidylcholine (DPC) on milk fat oxidation was examined at 50 and 95°C under various conditions by monitoring oxygen uptake and fatty acid composition. DPE strongly inhibited milk fat oxidation both at 50 and 95°C in the absence of water. DPC was less effective than DPE. In aqueous systems, the reverse was observed. DPE accelerated milk fat oxidation at both 50 and 95°C. DPC accelerated the oxidation at 50°C, but inhibited it at 95°C. The free amino group in DPE may be responsible for its inhibiting effect in the dry system. The accelerating activity of DPE in the aqueous system is probably due to the formation of a more dispersed structure with better oxygen accessibility. AA

1062

Sharma (GP). **Milk packaging and distribution modes in India - A scenario.** *Beverage and Food World* 1994): 1992: 24-25

Milk production in India has increased rapidly after the implementation of operation flood programme in 1970. A var. of milk distribution methods are described briefly. The methods described are: distribution in bottles, plastic cans, tetrapack system, plastic sachets, insulated fibre glass reinforced polystyrene tank, bulk vending system: and cost of distribution is considered. BV

1063

Rao (KVSS) and Balachandran (R). **Role of hydrocolloids in stabilizing milk systems.** *Beverage and Food World* 19(4): 1992: 35-38

Discusses some of the stabilizational aspects of various milk systems when added with hydrocolloids. Topics covered are: hydrocolloids and their classification, functions of hydrocolloids, protein-polysaccharide interactions (coprecipitation phenomenon), hydrocolloids in different milk systems(skim milk, recombined milks, flavoured milks, cultured milk beverage, condensed/evaporated milks, sterilized cream, UHT milk desserts, ultra-pasteurized yoghurt drink, ice cream mix, *paneer*, and baby formula). 36 references. BV

Milk products

1064

Patel (RS), Renner (E), Jayaprakasha (HM), Singh (S) and Yoon (YC). **Dietary calcium from milk products and its importance in human nutrition.** *Indian Dairyman* 44(11): 1992: 530-535

Reports the importance of Ca for the strength and integrity of teeth and bone: in the regulation of blood pressure, in the function of nervous system, for the growth of skeletal development, for the prevention of fractures and disability in later life: and its role as anti-cancer agent in the body. Dairy products like milk, dahi, yoghurt, paneer and cheese which are excellent sources of dietary Ca are recommended because compared to other sources of Ca the absorption of milk Ca is more due to the presence of co-nutrients like lactose, fat, protein and P in milk. The Ca content of dairy products are also given. GS

1065

Sarkar (S) and Misra (AK). **Utilization of milk preserved by LP-system for manufacture of cultured milk products.** *Indian Dairyman* 44911): 1992: 536-540

Reports the effect of lactoperoxidase-thiocyanate-hydrogenperoxide (LP) system on starter activity and manufacture of cultured milk products: the techniques to overcome the problem of reactivation of LP-system: and factors affecting successful utilization of LP treated milk for the manufacture of fermented milk products. GS

1066

Vaghela (MN) and Arun Kilara. **Nutritional and therapeutic aspects of indigenous and related western fermented milk products - a review.** *Indian Journal of Dairy Science* 45(8): 1992: 393-404

Aspects covered in this review include: nutritional attributes (fermentation of lactose, hydrolysis of protein and lipids, vitamins and minerals), therapeutic aspects (physiological, gastric emptying kinetics, glycemic index, urine acidity and health aspects: lactose intolerance, gastric diseases, gut microflora, atherosclerosis, anticarcinogenesis, antibacterial activity, neutralization of enterotoxins, growth promoting factors and immunological effects) and future prospects. 140 references. SRA

1067

Humbert (G), Collard-Bovy (C), Marchal (E), Linden (G), Montagne (P), Duheille (J), Varcin (P). **Microparticle-enhanced nephelometric immunoassay. 3. Application to milk and dairy products.** *Journal of Dairy Science* 74(11): 1991: 3709-3715

A microparticle-enhanced nephelometric immunoassay (NEPHELIA^{R}) has been developed for the measurement of milk, whey and curd proteins (α_s-casein, *K*-casein, α-lactalbumin, and β-lactoglobulin). This new method was applied to measure milk protein variations in a year-long study. The protein levels and their chronological evolution agree with other published data. The effects of some technological treatments on these measurements were studied: α-lactalbumin and *K*-casein were not modified during freezing-thawing cycles: β-lactoglobulin and α-$_s$-casein measurements were strongly influenced by freezing: the detn. of heat-processed β-lactoglobulin in the presence of *K*-casein was also altered: the technological treatments applied to raw milk for pasteurization and fat standardization of milk had no influence on the proteins' measured values. The β-lactoglobulin:α-lactalbumin ratio wasdetermined as a good indication of heat denaturation. It was unmodified in standardized milk as well as in whey. The *K*-casein level in milk was correlated with some cheese-making parameters, particularly with soft and pressed cheese yield, which could be a good predictive factor in cheese making. AA

1068

Walker (RL), Jensen (LH), Kinde (H), Alexander (AV) and Owens (LS). **Environmental survey for *Listeria* species in frozen milk product plants in**

California. *Journal of Food Protection* 54(3): 1991: 178-182

1069

Dommett (TW). **Spoilage of aseptically packaged pasteurized liquid dairy products by thermodynamic psychrotrophs.** *Food Australia* 44(10): 1992: 459-461

Pilot plant investigations with homogenised milk, cream and reverse osmosis concentrate showed that a monoculture of spore-forming bacilli normally forms *Bacillus circulans* or *B. cereus*. Eventual shelf-life was affected mainly by storage temp. after processing, but smaller effects were due to pasteurisation temp. and cycle time. *B. circulans* has important characteristics selecting for survival and growth, including for very low temp. and low oxygen and mild acid. These factors and very high incidence of this organism in the trials suggest that *B. circulans* could be a potential problem in commercial packaged products. SRA

1070

Mital (BK) and Garg (SK). **Acidophilus milk products: Manufacture and therapeutics.** *Food Reviews International* 8(3): 1992: 347-389

This review summarizes the pertinent literature with particular reference to the manufacture of acidophilus milk products and their potential as therapeutic agents. Aspects included are: characteristics and growth (carbohydrate fermentation, minerals, amino acids and vitamins, fatty acids, nucleic acid derivatives, antibiotic sensitivity), of acidophilus bacteria, product manufacture (acidophilus milk, acidophilus milk products, soy acidophilus products, dried products), enumeration, therapeutics (survival and establishment in gastrointestinal tract, stabilization of microflora and control of intestinal infections, control of serum cholesterol, prevention of colon cancer, enhanced availability of nutrients), and future research. 294 references. SRA

Cheese

1071

Bastian (ED), Hansen (KG) and Brown (RJ). **Activation of plasmin with urokinase in ultrafiltered milk for cheese manufacture.** *Journal of Dairy Science* 74(11): 1991: 3669-3676

Havarti and Saint-Paulin cheeses were manufactured by traditional and UF techniques. Urokinase and KIO_3 were added individually and together to batches of retentate before cheese making. Cheeses were analyzed for solids, fat, total N, pH 4.6 soluble N, NPN, plasmin activity, plasmin plus plasminogen activity, and casein degradation. 80 cheese samples were analyzed (2 var., 2 replications, and 5 treatments sampled after 1, 28, 56 and 84 days). Urokinase increased plasmin activity in UF Havarti and Saint-Paulin cheeses. This increased pH 4.6 soluble N levels and NPN, increased proteolysis of β-casein, and slightly improved the flavour profile (only Havarti). Potassium iodate in UF cheese inhibited starter organisms, did not influence plasmin activity, and did not improve ripening. Activation of plasminogen may aid in ripening some UF cheese var. AA

1072

Barbano (DM) and Rasmussen (RR). **Cheese yield performance of fermentation-produced chymosin and other milk coagulants.** *Journal of Dairy Science* 75(1): 1992: 1-12

Fat recovery, protein recovery, and cheese yield performance of a fermentation-produced chymosin was compared with other commonly used milk coagulants. In trial 1, performance of fermentation-produced chymosin was compared with proteases from *Mucor miehei* and *Mucor pusillus*. In trial 2, fermentation-produced chymosin was compared with calf rennet and adult bovine pepsin. In each trial, 3 vats of Cheddar cheese were made simultaneously from the same milk, using the same starter culture, with the 3 different coagulants. This was replicated 12 times in trial 1 and 9 times in trial 2. Generally, higher fat and protein losses in the whey were observed for proteases from *M. miehei* and *M. pusillus* than for fermentation-produced chymosin or calf rennet. Adult bovine pepsin had higher fat losses in the whey, but not higher protein losses in the whey than fermentation produced cymosin or calf rennet. In trial 1, fermentation-produced chymosin had a higher cheese yield efficiency than proteases from *M. miehei* and *M. pusillus* (0.54 and 0.74%, respectively) with a protected least significant difference of 0.34%. In trial 2, fermentation-produced chymosin (100% chymosin) and calf rennet (94% chymosin) had virtually identical cheese yield efficiencies, but adult bovine pepsin had a lower (0.39%) cheese yield efficiency with a protected least significant difference of 0.27%. AA

1073

Steele (JL) and Unlu (G). **Impact of lactic acid bacteria on cheese flavour development.** *Food Technology* 46(11): 1992: 128, 130, 132, 135

The enzymes and pathways believed to be of general importance in cheese flavour development is focused in this article. The importance of lactic acid bacteria in cheese flavour development either as the starter

culture or present as non-starter lactic acid bacteria, the metabolic properties of lactic acid bacteria, proteolysis and cheese flavour and the proteolytic enzyme system are the aspects covered. CSA

Cheddar cheese

1074

Grazier (CL), Bodyfelt (FW), McDaniel (MR) and Torres (JA). **Temperature effects on the development of Cheddar cheese flavour and aroma.** *Journal of Dairy Science* 74(11): 1991: 3656-3668

Cooling of freshly formed Cheddar cheese is thought to be one of the processing steps that requires tighter control to achieve more uniform and consistent product quality. Cheese samples, obtained after pressing, were rapidly cooled to 5, 15, 25 or 35°C. Commercial samples and test cheese at 7, 30, 60, 90 and 120 days of ripening were evaluated by a trained descriptive panel. Most sensory characteristics of experimental cheese increased in intensity as a function of the interaction of time and temp. The perception of sour and salty taste was affected by temp. but at equal rates over time. Buttery aroma and flavour tended to decrease in intensity as a function of time and temp. AA

1075

Blank (G), Shamsuzzaman (K) and Sohal (S). **Use of electron beam irradiation for mold decontamination on Cheddar cheese.** *Journal of Dairy Science* 75(1): 1992: 13-18

Cheddar cheese slices, surface inoculated with either *Penicillium cyclopium* or *Aspergillus ochraceus* spores, were vacuum packaged and irradiated using an electron beam accelerator. Following treatment at 0.21 and 0.52 kGy, the shelf-life of cheese containing *P. cyclopium* was extended by 3 and 5.5 days, respectively, in comparison with inoculated, untreated samples. Under similar treatment and storage conditions, cheese containing *A. ochraceus* exhibited average shelf-life extension of 42.5 and 52.2 days respectively. Increasing the post irradiation storage temp. to 15°C reduced the shelf-life of cheese, especially with samples containing *A. ochraceus*. The lowest dose required to inactivate ca. 50 to 60 spores/cm^2 of either *A. ochraceus* or *P. cyclopium* on the surface of cheese was ca. 0.42 and 0.95 kGy, respectively. Irradiation survival curves of *A. ochraceus* and *P. cyclopium* spores in cheese yielded av. values (the dose required to reduce initial populations by 90%) of 0.21 and 0.42 kGy, respectively. AA

Domiati cheese

1076

Abou-Zeid (NA). **Domiati cheese with vegetables.** *Indian Journal of Dairy Science* 45(8): 1992: 432-434

Some selected vegetables (Parsley, Rocket and Carrot) were used individually or in mixture at different concn. to make Domiati cheese. In panel tests, products made with 3% Parsley or Rocket got the best score and were chosen. During ripening of cheese, Parsley or Rocket increased protein and fat degradation and bacterial count, reflected by an improvement in the organoleptic properties of the manufactured cheese in a very short ripening period. AA

Mozzarella cheese

1077

Oberg (CJ), Merrill (RK), Moyes (LV), Brown (RJ) and Richardson (GH). **Effects of *Lactobacillus helveticus* culture on physical properties of Mozzarella cheese.** *Journal of Dairy Science* 74(12): 1991: 4101-4107

Six-liter vats of Mozzarella cheese were made using either single strains of *Lact. helviticus* or paired strains of *L. helveticus* and *Streptococcus salivarius* ssp. *thermophilus*. *Lact. helveticus* strains were either strongly or weakly proteolytic as established by the *o*-pthaldialdehyde test. Three cheeses were made with each culture type and stored at 4°C. Stretch, melt, colour, moisture, and pH values were determined at 1, 7, 14, and 28 days. All cheeses lost stretch rapidly from day 1 to 7 and slowly declined between day 7 and 28. Melt increased rapidly for all cheeses from day 1 to 7 and then remained constant. Differences in stretch and melt from one culture type to another were not significant. Cheese made with proteinase-deficient strains had more stretch after holding for 14 and 28 days than cheese made with nondeficient strains. Time of storage significantly affected both stretch and melt over 28 days. Cheeses made from all 4 culture types decreased in cook colour, but the culture by time interaction was significant. Cheese made with pairs or single strains of *Lact. helveticus* had the same melt, more stretch, and less cook colour than cheese made with paired strains of *Lact. delbrueckii* ssp. *Lact. bulgaricus* and *S. salivarius* ssp. *thermophilus* studies previously. AA

Dahi

1078

Misra (AK). **Commercial production of *dahi* by the dairy industry.** *Indian Dairyman* 44(10): 1992: 501-503

Reports the standardized method for commercial scale manufacture of '*dahi*' (fermented milk); the types of *dahi* available in Indian market viz., whole milk *dahi* skim milk *dahi* and sweetened *dahi*; and the processing conditions and technological parameters viz., heat treatment of milk, homogenization, inoculation of culture, filling in retail containers, incubation, storage of curds at refrigeration temp. shelf-life and packaging materials. GS

Ghee

1079

Galhotra (KK) and Wadhwa (BK). **Standardisation of spectrophotometric method for the estimation of lactones in ghee-residue.** *Indian Journal of Dairy Science* 45(8): 1992; 424-428

A spectrophotometric method was standardised for the estimation of lactones at 515 nm as their red-violet ferric hydroxamate derivatives. Difference in the lactone levels in *ghee*-residue estimated by spectrophotometric method and GLC method were non-significant. Hence the validity of the spectrophotometric method for the estimation of lactones in *ghee*-residue was confirmed. AA

Ice cream

1080

Jana (AH) and Patel (HC). **Soft scoop icecream - a review.** *Indian Dairyman* 44(11): 1992; 541-546

Reviews the factors influencing soft-scoop properties in an ice cream viz., use of sweetener blends, attaining higher over run, modifying the stabilizer/emulsifier blend, separate processing of an emulsion mix and ice cream mix plus carbohydrate slurry, subjecting the frozen mix to mechanical action etc. Problems associated with use of soft-scoop ice cream viz., different flavours, profile requiring consumer adaptation, difficult portion control and higher price, are also discussed. GS

Khoa

1081

Padmanabha Reddy (V) and Mohamed Habibulla Khan (M). **Effect of antimicrobial agents and packaging materials on the microbial quality of *Khoa*.** *Journal of Food Science and Technology (India)* 30(2): 1993; 130-131

The effectiveness of few selected antimicrobial agents and commonly available packaging materials on microbial quality of *khoa* during storage at 37 and 5°C showed a reduction in the counts of mesophilic aerobes, yeast and moulds with the incorporation of 0.30% potassium sorbate on product wt. basis and upon packing in Al foil. AA

Lassi

1082

Pillai (RAV), Mohamed Habibulla Khan (M) and Padmanabha Reddy (V). **Incidence of aerobic spore formers in *Lassi*.** *Journal of Food Science and Technology (India)* 30(2): 1993; 141-142

Analysis of 75 market samples of *lassi* revealed higher incidence of aerobic spore formers in samples from local vendors, followed by private manufacturers and organised dairies. The occurrence of *Bacillus subtilis* was high and the isolated *B. cereus* were non-toxigenic in nature. AA

Wheys

1083

Kanawjia (SK), Sukhbir and Singh (S). **Application of hydrolysed lactose whey in food processing.** *Indian Dairyman* 44(12): 1992; 600-603

Enzymatic process to manufacture hydrolysed lactose (HYLA) syrup from whey is described. Whey obtained from cheese/*paneer*/casein making is desalted by electrodialysis and pH is brought down to normally 3.6 with HCl. The acidified whey is centrifuged and pasteurized. Whey hydrolysis of lactose is performed by application of β-galactosidase enzymes obtained from any microbial source. The content is partially conc. (about 67.5% TS) after neutralization to pH 6.5. lactose crystals are added, the concentrate is cooled and packed. The application of HYLA in bread and bakery products, frozen milk and milk shakes, chewing gum and ice cream: their nutritive value and organoleptic advantages are discussed. GS

Whey protein concentrate

1084

Daufin (G), Labbe (J-P), Quemerais (A) and Michel (F). **Fouling of an inorganic membrane during ultrafiltration of defatted whey protein concentrates.** *Netherlands Milk and Dairy Journal* 45(4): 1991; 259-272

Ultrafiltration of sweet whey or defatted whey and whey protein concentrates has been carried out on an inorganic membrane. Fouling was modelled as

hydraulic resistances opposing solvent transfer. The fouling layers left on the membrane were characterized by infra-red and X-ray photo=electron spectroscopy. Despite the absence of lipids in defatted WPC, the membrane permeability decreased in the course of time. Calcium phosphates (apatite structures) were partly responsible for this. The part played by proteins, either absorbed or involved in the reversible concn. polarization layer, is larger when their concn. is higher, especially for lower pH values (6.25 as compared to 6.5). AA

Whey proteins

1085

Schmidt (DG) and Poll (JK). **Enzymatic hydrolysis of whey proteins. Hydrolysis of α-lactalbumin and β-lactoglobulin in buffer solutions by proteolytic enzymes.** *Netherlands Milk and Dairy Journal* 45(4): 1991: 225-240

The main whey proteins from cow's milk, α-lactalbumin (αLa) and β-lactoglobulin (βLg), were hydrolysed in 0.1 M buffer sol. using different proteolytic enzymes (serine proteinases, cysteine proteinases, aspartic proteinases and metallo-proteinases). The hydrolysates were studied by SDS gel electrophoresis. The action of the same enzyme on either αLa and βLg frequently differed and was further shown to depend on the composition of the medium (e.g. presence of Ca^{2+}), incubation temp. and the degree of denaturation of the protein. Both αLa and βLg were rapidly hydrolysed to a large extent by subtilisin and proteinase K. A rapid and extensive hydrolysis of αLa could further be achieved by α-chymotrypsin, pepsin and pronase. Large peptides with estimated mol. wts. between 2000 and 5000 were formed in appreciable amounts during the hydrolysis of αLa with α-chymotrypsin, elastase and pronase and of βLg with α-chymotrypsin, papain, bromelain and pronase. AA

Yoghurts

1086

Barnes (DL), Harper (SJ), Bodyfelt (FW) and McDaniel (MR). **Prediction of consumer acceptability of yoghurt by sensory and analytical measures of sweetness and sourness.** *Journal of Dairy Science* 74(11): 1991: 3746-3754

The objective of this study was to determine whether predictions of consumer overall liking for yoghurt could be made using trained panel ratings of sweetness and sourness and analytical measures of sugars and acids. 49 commercial prestirred yoghurts (14 strawberry-flavoured, 12-raspberry-flavoured, 6 lemon-flavoured, and 17 unflavoured) were evaluated for sweetness and sourness intensity by a trained panel (11 panelists) and for overall liking by a consumer panel (90 to 182 panelists). Titratable acidity and pH were measured for all samples, but sugars were measured by HPLC only for the flavoured yoghurts. Consumer overall liking was significantly correlated with sweetness intensity, sweetness:sourness ratio, and the summed impact of sweetness and sourness for strawberry and raspberry yoghurt. No correlations between analytical measurements and overall liking were found for any of the yoghurts. A sweetness:sourness ratio > 1.0 for strawberry-flavoured and > 0.8 for raspberry- and lemon-flavoured yoghurts appeared necessary for high consumer acceptance. Generally, it was found that the sweeter the yoghurt, the higher the acceptance of these fruit-flavoured yoghurts by consumers. No relationships were found for any sensory and analytical measurements for predicting the overall liking of plain yoghurt. The best predictors of consumer liking of fruit-flavoured yoghurt were the descriptive panel ratings. AA

1087

Opdahl (LJ) and Baer (RJ). **Composition and consumer acceptance of frozen yoghurts utilizing whey protein concentrates.** *Journal of Dairy Science* 74(12): 1992: 4151-4163

Whey protein concentrate (WPC) and a new fermented WPC were used to replace the milk SNF in frozen yoghurt. Fermented WPC was manufactured by fermenting liquid WPC with a commercial culture of *Lactobacillus delbrueckii* ssp. *thermophilus*. Frozen yoghurt mix contained 6% milk fat, 10.5% WPC (100% SNF replacement), 11% sucrose, 3% corn syrup solids, 0.3% stabilizer and emulsifier blend, and 30.8% total solids. The mix was pasteurized (72°C for 30 min) and cooled to 4°C. Fermented WPC (3.1% by wt. of mix) was then added for a final titratable acidity of 0.43%. Frozen yoghurt mix was divided into 3 batches, which were manufactured into vanilla, strawberry, and chocolate frozen yoghurt. The frozen yoghurts were evaluated from questionnaires filled out by 1005 attendees of the Meeker County Fair in Litchfield, MN. Those surveyed were 43.5% males and 56.5% females, ranging in age from 6 to 89 yr. Overall, 87.8% (83.5% of the males and 91.5% of the females) liked the test product, and 81.2% (72.4% of the males and 88.2% of the females) said they would buy this product if it were priced the same as ice cream. Results indicate that an acceptable frozen yoghurt can be produced when 100% of the milk SNF is replaced with WPC and fermented WPC. AA

1088

Gaafar (AM). **Volatile flavour compounds of yoghurt.** *International Journal of Food Science and Technology* 27(1): 1992: 87-91

The volatile flavour compounds of 3 samples of Egyptian yoghurt were analysed over a 2-wk period at 8°C using a simple headspace GC technique in order to study the changes and relate them to flavour acceptability. Volatile compounds present were acetaldehyde, diacetyl, acetoin, acetone, butanone, and acetic acid. Acetone and butanone disappeared within the first wk of storage, whereas acetaldehyde, diacetyl and acetoin declined steadily but were still present after 2 wks. Acetic acid increased to about twice its original level after 10 days of storage. The decreases in acetyldehyde, diacetyl, acetoin, and the increase of acetic acid were closely related to the rapid decrease in product acceptability after 8 - 10 days storage. AA

Milk proteins

1089

Gothwal (PP) and Bhavadasan (MK). **The role of proteins on browning in milk.** *Indian Journal of Dairy Science* 45(8): 1992: 419-423

The browning indices in control cow and buffalo skim milk samples were 0.469 and 0.685 respectively. The increase of increasing protein level resulted in increased browning index progressively upto protein level of 3.2% in cow milk. 5% protein level resulted in moderate increase in browning. This was more significant in buffalo milk. Studies using synthetic milk systems showed that casein contributes more to browning than whey protein. α_s-casein contributed to higher browning than by β- or *k*-casein. SRA

1090

Marchal (E), Collard-Bovy (C), Humbert (G), Linden (G), Montagne (P), Duheille (J), Varcin (P). **Microparticle-enhanced nephelometric immunoassay. 2. Measurement of α-lactalbumin and β-lactoglobulin.** *Journal of Dairy Science* 74(11): 1991: 3702-3708

A microparticle-enhanced nephelometric immunoassay (NEPHELIA^R) was developed for the detn. of α-lactalbumin and β-lactoglobulin in bovine milk, whey, and curd from soft cheese (Camembert-type cheese) and pressed cheese (Saint Paulin-type cheese). Diluted milk, whey, and dissolved curd samples were used without pretreatment and mixed with α-lactalbumin-coated or β-lactoglobulin-coated microspheres and highly diluted anti-α-lactalbumin-specific or anti-β-lactoglobulin-specific antiserum. After a reaction time of 1 h, the light scattered by the clusters of coated microspheres was measured using a nephelometer and compared with calibration curves developed with a low heat milk powder, corrected for its heat-sensitive β-lactoglobulin content. Recovery (97.2 to 102.2%) and precision (coeff. of variation from 1.4 to 6.1% for milk and whey) studies showed the reliability of this method for the quantitation of whey proteins. AA

1091

Mistry (VV) and Hassan (HN). **Delactosed, high milk protein powder. 2. Physical and functional properties.** *Journal of Dairy Science* 74(11): 1991: 3716-3723

The objective of this research was to examine some physicochemical properties of a novel delactosed, high milk protein powder. Data indicate that the solubility index of the powder was dependent on temp. of mixing. Solubility index decreased (solubility increased) as temp. increased from 25 to 60°C. Foaming capacity, expressed as percentage overrun, was low at pH 7 and 8 but increased at higher pH; e.g., after 10 min of whipping, overrun increased from 470 to 941% as pH increased from 7 to 10. Foaming increased with time at higher pH but not at lower pH. Particles of the high milk protein powders as examined by scanning electron microscopy were characterized by smooth surface and dents. Particles of skim milk powder prepared in the same spray dryer had a wrinkled surface. Commercial casein products had a structure similar to that of the high milk protein powders. AA

1092

Schmidt (KA) and Smith (DE). **Rheological properties of gum and milk protein interactions.** *Journal of Dairy Science* 75(1): 1992: 36-42

Three different gums (*K*-carrageenan, guar, and xanthan at concn. of 0.05, 0.10, or 0.20%) were dispersed in 11% NDM, 11% whey protein conc., or double-distilled, deionized water. All sol. were either batch (69°C for 30 min) or HTST (81°C for 25 s) pasteurized. Rheological properties were measured the following day using a viscometer. Measurements were made at 4°C over a shear rate range of 1 to 875 s^{-1}. Apparent viscosities were calculated and compared at shear rate of 250 s^{-1}. A 4-factor interaction involving gum type, gum concn. protein type and heat treatment was significant. Differences among the means showed that carrageenan-NDM sol. were more viscous than carrageenan-water sol. when compared at equivalent gum concn. The flow behaviour index values indicated that at low gum concn. the sol. possessed Newtonian flow behaviour; however, at

higher concn., the flow behaviour was pseudoplastic. AA

Caseins

1093

Collard-Bovy (C), Marchal (E), Humbert (G), Linden (G), Montagne (P), El Bari (N), Duheille (J), Varcin (P). **Microparticle-enhanced nephelometric immunoassay. 1. Measurement of α_s-casein and *k*-casein.** *Journal of Dairy Science* 74(11): 1991: 3695-3701

α_s-Casein and *K*-casein were measured in milk and curd by a microparticle-enhanced nephelometric immunoassay (NEPHELIA^R). Specifically designed microspheres were coated with antigen (α_s-casein and *K*-casein) and then were agglutinated by specific antibodies. The light scattered by the agglutinates was quantified with a nephelometer. Antigen-coated microsphere agglutination was inhibited by free antigen sol., allowing its measurement. Calibration curves for α_s-casein and *K*-casein in milk and curd, performed with a low heat milk powder as standard, largely covered the usual concn. of caseins. Accuracy (av. ratios of recovery were 98.7 and 104.3%) and precision (coeff. of variation from 1.9 to 7.4%) assessed the fidelity of the method. NEPHELIA^R, applied to casein detn., offers many advantages over the classical methods of milk protein measurement: high dilution of the reagents, no pretreatment of the samples, enhanced sensitivity (few micrograms per liter), short reaction time (1 h), and easy use (no washing or phase separation). AA

MEAT AND POULTRY

1094

Forsythe (RH) and Waldroup (AL). **Safe meat and poultry: An industry achievement.** *Dairy, Food and Environmental Sanitation* 12(3): 1992: 149-153

Meat

1095

Tarwate (BG), Sherikar (AT) and Murugkar (HV). **Microbiological analysis of environmental sources of contamination in Deonar Abattoir.** *Journal of Food Science and Technology (India)* 30(2): 1993: 127-129

Investigation was carried out to analyse microbiological hazards and to determine the critical control points in the buffalo slaughterline. Nine different points in the slaughterhouse were selected and samples were analysed for total viable counts and the numbers of faecal coliforms. Enterobacteriaceae, *Bacillus* spp., *Staphylococcus* spp. and *Clostridium* spp. Highly significant differences among different points were observed. The max. levels of contamination amongst slaughterhouse points were noted for floors, platforms and walls with a mean total viable count of 4.11 plus or minus 0.50 $\log_{10}$ CFU/sq cm. The floors, platforms, walls, knives, axe, saw-blade, hooks and handswabs were considered as critical points in the slaughterhouse and monitoring of these points would lead to the development of HACCP in slaughterhouse. AA

1096

Lambert (AD), Smith (JP) and Dodds (KL). **Shelf-life extension and microbiological safety of fresh meat - a review.** *Food Microbiology* 8(4): 1991: 267-297

This review focuses on the biochemical and microbiological composition of fresh meat, the spoilage patterns in fresh meat and the combination treatments which can be used by the meat processor to extend the shelf-life and keeping quality of meat at refrigerated storage temp. The review also addresses the safety concerns of modified atm. packaging/irradiated fresh meat specifically with respect to growth of, and toxin production by *Clostridium botulinum* types A and B and other pathogens, particularly under mild temp. abuse conditions. 153 references. SRA

1097

Gill (CO) and Jeremiah (LE). **The storage life of non-muscle offals packaged under vacuum or carbon dioxide.** *Food Microbiology* 8(4): 1991: 339-353

Beef livers and sweetbreads and pork livers and kidneys were collected from commercial slaughter operations, packaged under vacuum or CO_2, and then stored at -1.5°C. Offals were microbiologically and organoleptically assessed at intervals of 3 wks until they were grossly spoiled. After 6 wks storage, vacuum-packaged livers had a low pH and were spoiled by autolytic and microbial activities. Carbon dioxide packaging delayed the fall in tissue pH and the development of microbial spoilage, but did not obviously retard the autolytic deterioration of livers. After 6 wks storage, vacuum-packaged kidneys were spoiled by lines of white granules (presumably tyrosine crystals) on organ surfaces and, after 12 wks storage, by offensive odours and flavours of microbial origin. Carbon-dioxide packaging delayed the appearance of blemishes for further 9 wks and microbial spoilage of kidneys for a further 3 wks. After 12 wks storage, vacuum-packaged sweetbreads were spoiled by green discolouration

and spoilage odours and flavours as results of microbial activities. Carbon-dioxide packaging prevented the development of green discolouration and extended the time before spoilage odours and flavours were evident to 18 wks. However, after storage for 9 wks the appearance of sweetbreads packaged under CO_2 deteriorated because of staining of surfaces with blood pigments. AA

1098

Vanderlinde (PB) and Grau (FH). **Detection of *Listeria* spp. in meat and environmental samples by an enzyme-linked immunosorbent assay (ELISA).** *Journal of Food Protection* 54(3): 1991: 230-231

An ELISA kit (TECRA^{TM}) for the detection of *Listeria* spp. was evaluated for its ability to detect these organisms in naturally contaminated meat and in environmental samples from meat processing plants. Of the 170 samples examined, *Listeria monocytogenes* and/or *L. innocua* were detected in 74 by enrichment and selective plating. Testing of enrichment broths with the ELISA kit detected 72 of the positive samples and gave 2-false-negative and 2 false-positive reactions. AA

1099

Taylor (MAJ) and Etherington (DJ). **The solubilization of myofibrillar proteins by calcium ions.** *Meat Science* 29(3): 1991: 211-219

The effect of elevated levels (30 mM) of ca^{2+} and other divalent metal ions on rabbit psoas myofibrils was studied to determine whether these caused solubilization of structural proteins and if so whether the effect was due to salting-in or to proteolytic fragmentation resulting from activation of calpains. Incubation of myofibrils in 30 mM $CaCl_2$ at either pH 5.6 or 7.0 did not cause any apparent solubilization of the major Z-disc proteins, but there was an immediate (< 1 min) solubilization of C-protein and troponin I together with small amounts of Mr 80000 protein, troponin T and tropomyosin. Longer incubations with $CaCl_2$ extracted little additional C-protein but there was a steady increase with time in the solubilization of proteins with Mr values of 45000 and 42000. troponin T , tropomyosin and troponin I. Another high mol. wt. protein of Mr 3-400 000 was extracted at pH 7.0 but not at pH 5.6. Similar results were obtained on incubation with 30 mM $MgCl_2$. In contrast to these findings, the same concn. of $ZnCl_2$ caused no detectable solubilization of myofibrillar proteins. The inclusion of proteinase inhibitors, E64, leupeptin, pepstatin or PMSF did not prevent the immediate solubilization of proteins. This showed that the solubilization of the proteins by Ca^{2+} ions was due to salting-in rather than to proteolytic action by calpains. AA

1100

Correia (LR) and Mittal (GS). **Kinetics of hydration properties of meat emulsions containing various fillers during smokehouse cooking.** *Meat Science* 29(4): 1991: 335-351

The cooking kinetics of meat emulsions containing various fillers was determined by monitoring changes in hydration properties such as cooking loss and water-holding capacity during smokehouse cooking. Press juice, consumer cook test and emulsion stability of cooked product were also determined. The fillers used were buttermilk powder, corn starch, microcrystalline cellulose, modified corn starch, modified wheat flour, soy-protein conc. and whey-protein conc. The cooking process was modelled using reaction kinetics and Eyring's absolute reaction rate theory. Enthalpy and entropy changes of activation were calculated for various properties and fillers. AA

1101

Correia (LR) and Mittal (GS). **Kinetics of pH and colour of meat emulsions containing various fillers during smokehouse cooking.** *Meat Science* 29(4): 1991: 353-364

The cooking kinetics of meat emulsions containing various fillers was determined by monitoring changes in pH and colour during smokehouse cooking. The fillers used were buttermilk powder, corn starch, microcrystalline cellulose, modified corn starch, modified wheat flour, soy protein concentrate and whey protein concentrate. The cooking process was modelled using reaction kinetics and Eyring's absolute reaction rate theory. Enthalpy and entropy changes of activation were calculated for various properties and fillers. AA

1102

Tompkin (RB), Christiansen (LN), Shaparis (AB), Baker (RL) and Schroeder (JM). **Control of *Listeria monocytogenes* in processed meats.** *Food Australia* 44(8): 1992: 370-371, 373-376

This article summarises several recommendations and regulatory policies for *L. monocytogenes* in processed meats, and describes the experiences of one producer in attempts to control *L. monocytogenes* in 12 processed meat plants. It is concluded that the risk of product contamination by *L. monocytogenes* can be reduced but, with current technology, the organism cannot be eradicated from the finished product environment. SRA

1103
Barai (BK), Nayak (RR), Singhal (RS) and Kulkarni (PR). **Approaches to the detection of meat adulteration.** *Trends in Food Science and Technology* 3(3): 1992: 69-72

Reviews common meat adulterants such as dried bread, corn meal potato starch, crackers, waste biscuit, boiled rice, chickpea flour, and water gelation in smoked meat products: blood in hamburgers: sausages (frankfurters, bologna and pork): soybean protein, non-fat dried milk, milk co-precipitates and cereal flours. The DNA probe technology for meat sp. testing may give rise to a new battery of tests for meat adulteration. Techniques (electrophoretic, immunological (ELISA) and other analytical techniques) for the identification of meats from different animal sp. is covered briefly in this review. 33 references. GS

Beef

1104
Renerre (M) and Bonhomme (J). **Effects of electrical stimulation, boning-temperature and conditioning mode on display colour of beef meat.** *Meat Science* 29(3): 1991: 191-202

1105
Surve (AN), Sherikar (AT), Bhilegoankar (KN) and Karkare (UD). **Preservative effect of combinations of acetic acid with lactic or propionic acid on buffalo meat stored at refrigeration temperature.** *Meat Science* 29(4): 1991: 309-322

Mutton

1106
Kondaiah (N), Anjaneyulu (ASR) and Lakshmanan (V). **Incorporation of chicken byproducts in mutton nuggets.** *Journal of Food Science and Technology (India)* 30(2): 1993: 143-144

Emulsion-based mutton nuggets, incorporating chicken byproducts i.e. skin, gizzard and heart (SGH) from spent hens, were evaluated for yield and quality. Three formulations containing 15% mutton fat, 15 and 25% SGH were compared. Emulsion stability, cooking loss and composition were nearly similar, but flavour scores were significantly higher for 15% SGH. Incorporation of SGH resulted in better acceptability of mutton nuggets as compared to those with mutton fat. AA

Goat

1107
Horgan (DJ), Jones (PN), King (NL), Kurth (LB) and Kuypers (R). **The relationship between animal age and the thermal stability and cross-link content from five goat muscles.** *Meat Science* 29(3): 1991: 251-262

The thermal stability of intramuscular collagen, as determined using differential scanning calorimetry, was measured in 5 muscles from 75 goats with known birth dates ranging in age from one day to 13 yrs. The collagen cross-link pyridinoline, and the collagen-associated, and putative cross-link, Ehrlich Chromogen were also measured. Five different muscles were examined and the effects of age compared to those found in the tendon of the *Longissimus dorsi* muscle. The differences between intramuscular collagen and tendon collagen were found to be much greater than those between the intramuscular collagens of different muscles. Intramuscular collagen is more thermally stable than tendon collagen due to higher levels of heat-stable cross-links. However the increase in thermal stability of intramuscular collagen with age could not be explained simply in terms of the cross-links measured. AA

Sheep

Lamb

1108
Jones (SDM), Jeremiah (LE), Tong (AKW), Robertson (WM) and Gibson (LL). **Estimation of lamb carcass composition using an electronic probe, a visual scoring system and carcass measurement.** *Canadian Journal of Animal Science* 72(2): 1992: 237-244

Sixteen hundred and sixty lambs were used to determine the precision of carcass measurements (fat thickness, muscle thickness, tissue depth) and a visual scoring system for muscle and fat thickness to estimate carcass composition. Measurements of fat (F) and muscle (M) thickness were made in warm and cold carcasses and total tissue depth in warm carcasses only between the 10th and 11th ribs and the 12th and 13th ribs using an electronic probe (Hennessy Grading Probe HGP). F explained 40 - 64% of the variation in carcass lean and 44-72% of the variation in carcass fat depending on the location and number of measurements and whether they were made on a warm or cold carcass. In most cases when M was added to F there was no increase in the variation explained in composition over that provided by F alone. Total tissue depth measurements differed in precision for the prediction of carcass lean content with the 12th rib being superior to the 10th rib (RSD for 12th rib, 33.2 g kg^{-1}; 10th rib, 36.6 g kg^{-1}). Visual assessment of

carcasses for fatness had the lowest precision for the prediction of lean content (RSD, 44.5 g kg^{-1}). Loin eye area and fat thickness measured at the 12th rib had similar precision for the estimation of lean content as probe measurements. It was concluded that probe measurements of F or tissue depth between the 12th and 13th ribs would provide a superior method to the visual assessment of carcass fatness used in this study for classifying lamb carcasses for lean content and would allow carcasses to be graded on the slaughter floor. AA

Pork

1109

Leseigneur-Meynier (A) and Gandemer (G). **Lipid composition of pork muscle in relation to the metabolic type of the fibres.** *Meat Science* 29(3): 1991: 229-241

Rabbit

1110

Kang (JO), Kamisoyama (H), Shigemori (S), Hayakawa (I) and Ito (T). **Effect of electrical stimulation on the rheological properties of rabbit skeletal muscle.** *Meat Science* 29(3): 1991: 203-210

The effect of electrical stimulation on the rheological properties of rabbit skeletal muscle after death was investigated. The extensibility of electrically stimulated psoas muscles decreased more rapidly than that of non-stimulated muscles. For raw non-stimulated *Longissimus thoracis* muscles excised from the carcasses immediately after slaughter, the penetration force required was greatest 24 h after slaughter and then decreased slightly after 168 h. The corresponding force for stimulated *L. thoracis* muscles increased to the max. in 12 h and decreased to values < non-simulated muscles. However, in the case of raw *L. thoracis* muscles which had been attached to the skeleton until measurement, there was no significnat difference in penetration force between stimulated and non-stimulated muscles. In cooked muscles, electrical stimulation resulted in lower penetration forces at 24 h post mortem, but on further storage the differences decreased. AA

Products

1111

Hung (SC) and Zayas (JF). **Functionality of milk proteins and corn germ protein flour in commercial meat products.** *Journal of Food Quality* 15(2): 1992: 139-152

Effects of corn germ protein flour (CGPF), nonfat dry milk (NFDM), whey protein concentrate (WPC), and sodium caseinate (SC) on quality characteristics of comminuted meat products were studied. Water holding capacity (WHC) was lowest and cooking loss was highest for the control formulation, whereas formulations extended with CGPF and milk proteins were higher in WHC and lower in cooking losses. Shear force and firmness increased as extenders were added, except WPC. All frankfurters with extenders were firmer than the control, except those extended with WPC. Hue angle was highest for samples with CGPF, while no differences were found in hue angle between control and milk proteins containing samples, except samples with WPC. Frankfurters with CGPF and SC add has a stronger atypical aroma than the control. Meaty aroma score was higher for the control than the other products, except those with WPC. Meaty flavour score was higher for the control than for all other products. The product with CGPF added had a stronger atypical flavour than the control. Frankfurters containing extenders were not as juicy as the all-meat control. AA

1112

Wang (CR) and Zayas (JF). **Comparative study of corn germ and soy proteins utilization in comminuted meat products.** *Journal of Food Quality* 15(2): 1992: 153-167

No significant differences in proximate composition of frankfurters containing soy flour (SF), soy concentrate (SC) and corn germ protein flour (CGPF) at 3.5% or 2% soy isolate (SI) were observed. Frankfurters formulated with high plant protein flour had lower cholesterol, and higher protein content than the all-meat control frankfurters. Control frankfurters had lower water holding capacity and higher cooking losses than those containing plant proteins. No significant differences ($P > 0.05$) were found in textural and colour characteristics. A typical aroma and flavour profiles increased in frankfurters with SF and CGPF extension. BV

1113

Zarkadas (CG). **Assessment of the protein quality of selected meat products based on their amino acid profiles and their myofibrillar and connective tissue protein contents.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 790-800

The amino acid profiles and levels of myosin, actin, collagen, and collagen-like proteins in extended composite meats were examined as potential indices to assess protein quality of such products. The myofibrillar and connective tissue protein levels of

typical composite meat products were determined from the amounts of N-methylhistidine and 5-hydroxylysine, respectively, found in their acid hydrolysates. When the sum of the myofibrillar and connective tissue proteins was substracted from the total protein of these products, the difference was an accurate detn. of the nonmeat proteins present. Composite meats varied in their amino acid composition and content of myofibrillar (17.4 - 52.3%), connective tissue (4.1 - 19.0%), and nonmuscle protein (2.4 - 67.2%), depending upon the meat cuts and nonmeat protein ingredients used to formulate them. As the content of collagen increased, three of the nonessential amino acids, glycine, proline, and 4-hydroxyproline, increased while the levels of lysine and other essential amino acids decreased. Calculated PERs ranged from 2.7 to 2.9 depending upon amounts of nonmuscle protein additives present. AA

Ham

1114

Andersen (HJ) and Rasmussen (MA). **Interactive packaging as protection against photodegradation of the colour of pasteurized, sliced ham.** *International Journal of Food Science and Technology* 27(1): 1992: 1-8

Interactive packaging using oxygen absorbers with concomitant development of carbon dioxide and packaging material with low oxygen transmission rate (OTR: 2 cm^3m^224 h atm^{-3}) has been found to completely eliminate discoloration of pasteurized, sliced ham normally encountered as a result of photo-oxidation of nitric oxide pigments during the first 24 h of display in illuminated chill cabinets. Further this packaging procedure has been found to be superior to conventional vacuum-packaging (90% initial vacuum) with regard to overall sensory evaluation, and equal to vacuum-packaging with 99% initial vacuum and interactive packaging using oxygen absorber, respectively, with regard to both overall sensory evaluation, and microbial load at the end of a storage period of 26 days. AA

Sausages

1115

Alley (G), Cours (D) and Demeryer (D). **Effect of nitrate, nitrite and ascorbate on colour and colour stability of dry, fermented sausage prepared using 'Back Slopping'.** *Meat Science* 32(3): 1992: 279-287

The effect of various levels of nitrite and nitrate, with and without ascorbate, in sausages prepared using 'back slopping' as inoculation, was investigated in 3 series of exp., in all exp., nitrite was rapidly depleted and nitrate formed. Nitrate was not used, probably because of the lack of (active) micrococci in the starter sausage. Surface colour was found to be darker with increasing levels of nitrite. Irrespective of nitrate, colour stability was mainly promoted by residual ascorbate. The latter decreased with increasing nitrite levels. AA

Poultry

1116

Haq (S), Jalil (MA), Islam (MR) and Begum (J). **A review on the poultry production and development in Bangladesh.** *Poultry Guide* 29(9): 1992: 57-60

Reviews poultry population and distribution in Bangladesh, its socio-economic aspects, public sector and private sector development strategies; farmers training programmes; poultry diseases; fund and credit facilities and marketing systems. GS

1117

Panda (B). **Poultry development strategies.** *Poultry Guide* 29(11): 1992: 21-27

Evaluates the Indian poultry industry covering the salient strategies of research and development of poultry production, problems and solutions in poultry breeding, poultry feed, health, housing and management; efforts made in improvising post-harvest technology and marketing of poultry; agencies to impart poultry education and training; institutional finance and insurance facilities; inclusion of other avian species with poultry farming and strategies for future development of the industry. GS

Chickens

1118

Sachdev (AK), Verma (SS) and Ram Gopal. **Processing of chicken gizzard pickle.** *Poultry Guide* 29(9): 1992: 33-36

Chicken gizzard pickles - ((i) oil-based (OB) and (ii) Vinegar-based (VB)) were processed and stored under different ambient conditions. They stored well at ambient and refrigerated temp. for 45 days in summer, rainy (av. ambient temp. 27.30 to 34.15°C; 63.05 to 68.35% RH) and upto 75 days in winter (16.58 to 25.64°C; 61.15 to 71.20% RH) seasons. Cost of production of OB pickle was higher. GS

1119

Gillett (RAN) and Carpenter (JA). **Effects of binding substrate, type of nonmeat additive and method of tenderizing on cured chicken rolls.** *Journal of Food Quality* 15(3): 1992: 225-238

Chicken rolls were manufactured using ground dark fowl meat or mechanically deboned poultry meat as a binding substrate, Na caseinate or soy isolate and a meat block that was mechanically tenderized or chunked. Effects of these treatments on yield, chemical composition, sensory and texture profile attributes were evaluated in this study. Inclusion of soy isolate increased the cook yield and improved colour over Na caseinate ($P < 0.05$). Likewise, rolls containing ground-dark fowl meat were lighter in colour than those made with mechanically deboned poultry meat. Rolls made with mechanically deboned poultry meat had greater chewiness, while those made with Na caseinate had greater cohesiveness. Texture profile analysis indicated that mechanical tenderization was the predominant factor in producing a softer and more springy chicken roll. Sensory evaluation revealed that mechanical tenderization decreased chewiness as compared to cubing ($P < 0.05$). AA

1120

Lakritz (L) and Thayer (DW). **Effect of ionizing radiation on unesterified tocopherols in fresh chicken breast muscle.** *Meat Science* 32(3): 1992: 257-265

The effect of ionizing radiation on free tocopherols in chicken was determined. Raw chicken breast muscle with skin and adipose tissue removed was subjected to γ-radiation from a ^{137}Cs source at 1, 2.25, 5.0 and 10.0 kGy. The chicken was packaged aerobically, and irradiated at 4°C. Free tocopherols were extracted directly from the meat without a saponification step. The tocopherols were resolved using normal phase, HPLC by spectrophotofluorometric detection. Irradiation resulted in a significant linear decrease in α- and γ-tocopherol with increasing dose levels. At 3 kGy, the max. level approved by the FDA for poultry, a 15% reduction of free γ-tocopherol and a 30% reduction for free α-tocopherol were observed. AA

1121

Shahidi (F), Synowieeki (J) and Onodenalore (AC). **Effects of aqueous washings on colour and nutrient quality of mechanically deboned chicken meat.** *Meat Science* 32(3): 1992: 289-297

Mechanically deboned chicken meat (MDCM) was washed with water, 0.5% NaCl or 0.5% $NaHCO_3$ sol. Approx. 75.5% of the total hemoprotein pigments were removed by washing of MDCM with a sodium bicarbonate sol. which resulted in the best colour improvements in the samples. Approx. 18.7% of total lipids were removed as a result of aqueous washing. The yield of proteins ranged from 56.5% after one washing with water to 43.4% after washing with water and then with a sodium bicarbonate sol. The Hunter *L* and a colour parameters of the samples correlated well with the total hemoproteins (correlation coeff. -0.984 and +0.947, respectively); corresponding correlation coeff. with the Hunter *b* value was only +0.693. AA

1122

Surowka (K) and Fik (M). **Studies on the recovery of proteinaceous substances from chicken heads. I. An application of neutrase to the production of protein hydrolysate.** *International Journal of Food Science and Technology* 27(1): 1992: 9-20

Minced heads of broiler chickens were hydrolysed under various conditions using neutral protease from *Bacillus subtilis*. It was found that hydrolysis goes at an optimum rate at 55°C and pH 7. Addition of 75% of water and 0.2% of the enzyme (w/w) to the hydrolysed raw material was sufficient to obtain a good hydrolysis yield. After 6 h of proteolysis, 1 kg of the raw material yielded 75 g of dry hydrolysate with 78.1% total protein content (N x 6.25). The nitrogen yield from this raw material amounted to 39.6%. The final product was brown coloured, of good microbiological quality, had no bitter taste and contained a number of mineral compounds. It also revealed good solubility in water but had relatively poor emulsifying properties. It was shown that nutritional quality of the product is limited by sulphur amino acids. AA

1123

Kamat (AS), Alur (MD), Nerkar (DP) and Nair (PM). **Hygienization of Indian chicken meat by ionizing radiation.** *Journal of Food Safety* 12(1): 1991: 59-71

Fresh and frozen chicken (25 samples) were evaluated for total bacterial counts and for pathogens like *Enterobacteria*, *Bacillus cereus*, *Staphylooocccus* spp., and *Salmonella* by using appropriate microbiological media. Most of the samples exhibited heavy bacterial contamination ($1.2 \times 10^5 - 2.6 \times 10^6$/g), mainly with *Staphylococcus* spp. ($7.5 \times 10^4 - 3.6 \times 10^5$ cfu/g). All the chicken samples also showed the presence of *Salmonella* ($3 \times 10^1 - 2.1 \times 10^2$/g). *Sal. typhimurium* was observed to be present in both fresh as well as frozen chicken samples. The D_{10} values of *Salmonella* spp., viz. *Sal. typhimurium* and *Sal. seftenberg* in phosphate buffer (pH 7.2) were 0.12 and 0.25 respectively and in chicken homogenate (10%) were 0.25 and 0.60 kGy offering approx. 2-fold protection by the chicken. The results suggest that a dose of 2 kGy is adequate

for normally contaminated chicken samples, but for the heavily contaminated chicken a dose of 4 - 5 kGy, depending upon the predominating *Salmonella* serotype present is required. CSA

Broilers

1124
Sahoo (G) and Shingari (BK). **Effects of floor space on meat quality in commercial broilers.** *Poultry Guide* 29(11): 1992: 39-43

Chicks were reared on 3 types of floors - (i) deep litter (ii) slate and (iii) wire floors upto 8 wks of age. Their body chemical composition, efficiency of nitrogen utilization (ENU) and efficiency of energy utilization (EEU) were determined at 6 or 8 wks. Results indicated that fat contents increased and moisture decreased with the decrease in floor space per bird. ENU increased as the floor space per bird decreased from 930 cm^2/bird to 465 cm^2/bird but was adversely affected at 310 cm^2/bird. EEU was better at 930 cm^2, 697 cm^2 and 465 cm^2/bird compared with 310 cm^2/bird group. Hence, 310 cm^2/bird on wire floor was considered undesirable for its meat quality. GS

Duck

1125
Wu (C-M) and Liou (S-E). **Volatile components of water-boiled duck meat and Cantonese style roasted duck.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 838-841

The volatile compounds of water-boiled duck meat, duck fatty tissue, and Cantonese style roasted duck and its gravy were isolated by steam distillation and solvent extraction and then identified by GC and GC-MS, respectively. The major volatiles identified from water-boiled duck meat were the common degradation products of fatty acids except indole, which was identified for the first time in the water-boiled meat. It may be specifically related to duck meat aroma. Cantonese style roasted duck contained most of the volatiles found in duck meat plus pyrazines, pyridines, thiazoles, isoamyl alcohol and phenyl ethyl alcohol. AA

Turkeys

1126
Phebus (RK), Draughon (FA) and Mount (JR). **Survival of *Campylobacter jejuni* in modified atmosphere packaged turkey roll.** *Journal of Food Protection* 54(3): 1991: 194-199

Survival of *Camp. jejuni*, inoculated into turkey roll slices and stored under 7 different atm. mixtures, was determined. Turkey roll samples were stored at 4°C for 18 days and at 21°C for 48 h. The effects of various atm. mixtures on aerobic, psychrotrophic, and lactic acid bacteria populations were also determined throughout storage. *Camp. jejuni* was inactivated under all atm. gas mixtures tested throughout storage. Increasing CO_2 concn. inside the package from 0% to 100% CO_2 resulted in a lower rate of inactivation of *Camp. jejuni* at both storage temp. Increases in CO_2 concn. provided greater inhibition of aerobic and psychrotrophic populations as compared to low CO_2 levels. The effect of CO_2 on survival of *Camp. jejuni* and growth rate of aerobic, psychrotrophic, and lactic acid bacteria was more pronounced at 4°C. *Campylobacter* were isolated from inoculated turkey roll held under all atm. by enrichment procedures on the 18th day and 48th h of storage at 4 and 21°C, respectively, with an initial population of log 6.0 *campylobacters*/g. However, no *campylobacters* were isolated by 18 days of storage at 4°C by direct plating. AA

Products

Eggs

1127
Sharma (RR) and Mehta (RK). **Egg quality factors in force-moulted commercial white leghorn hens.** *Poultry Guide* 29(9): 1992: 71-76

Quality factors such as egg size, Haugh units, albumen, yolk and shell contents of eggs were determined for 8 different periods of 28 days duration. Layers fed with diets containing 13% (T_1), 15% (T_2) and 17% (T_3) crude protein (CP). 15% CP based diet was most economical. % albumen content in the 3 treatments was not significantly different but albumen contents of eggs increased significantly with the age. Yolk contents increased significantly with the level of protein in the diet. The av. values of shell and Ca contents were 11.7%, 36.9% in T_1 and 10.9%, 37.3% in T_2 and T_3 respectively. GS

1128
Nidhi and Saxena (UC). **Our health, nutrition and egg.** *Poultry Guide* 29(11): 1992: 65-67

Balanced diet for men and women is indicated grouping food items on the basis of their nutrients Listing different ways of egg consumption, inclusion of the same in diet as a protective food is emphasised. GS

1129

Brackett (RE) and Beuchat (LR). **Survival of *Listeria monocytogenes* in whole egg and egg yolk powders and in liquid whole eggs.** *Food Microbiology* 8(4): 1991: 331-337

A mixtrue of 5 strains of *Listeria monocytogenes* was inoculated at 2 populations (approx. 10 cfu g^{-1} and 10^5 cfu g^{-1}) into commercially dried powdered whole egg (CDPWE), egg yolk (EY) and liquid whole egg (LWE). Inoculated dried egg products was stored at 5 and 20°C for 180 days, LWE was stored at 0 and -18°C for 14 and 168 days. The presence and populations of viable cells were determined periodically throughout storage. All egg products inoculated with 10 cfu g^{-1} yielded viable *Listeria* cells throughout storage. *L. monocytogenes* decreased about 1 and 1.5 $\log_{10}$ cfu g^{-1} in CDPWE and EY respectively, when inoculated with 10^5 cfu g^{-1} and stored at 5°C. Inactivation occurred more rapidly at 20°C. The number of viable *L. monocytogenes* in frozen LWE initially containing 10^5 cfu g^{-1} remained unchanged throughout storage. These results indicate that *L. monocytogenes* can survive throughout the normal shelf-life of powdered and frozen egg products. SRA

1130

Gast (RK) and Beard (CW). **Detection and enumeration of *Salmonella enteritidis* in fresh and stored eggs laid by experimentally infected hens.** *Journal of Food Protection* 55(3): 1992: 152-156

Only 3% of the fresh laid eggs and 4% of the eggs stored for 7 days at refrigerator temp. showed presence of *S. enteritidis*. 16% of eggs stored for 7 days at room temp. (25°C) showed *S. enteritidis* contamination. It is concluded that maintaining low temp. during storage and handling of eggs is essential if the expansion of S. enteritidis *populations in egg contents is to be minimized. BV*

SEAFOODS

1131

Moskowitz (HR). **Importance of sensory factors in processed seafood: Methods and results.** *Journal of Sensory Studies* 7(2): 1992: 147-156

This paper considers the 3 key measures of importance viz. attitudinal importance measures, what consumers think to be important and refers to general opinions about the category; sensory system importance, how strongly different sensory inputs (appearance, aroma etc) drive overall liking and show the key sensory inputs to which consumers attend; and the attribute level importance, the relation between sensory intensity and overall liking for each attribute. SD

1132

Noah (CW), Perez (JC), Ramos (NC), McKee (CR) and Gipson (MV). **Detection of *Listeria* spp. in naturally contaminated seafoods using four enrichment procedures.** *Journal of Food Protection* 54(3): 1991: 174-177

Four enrichment procedures were evaluated for the recovery of *Listeria* spp. from 211 samples of raw and processed seafoods. The presence of *Listeria* spp. was determined in all 4 methods by a commercial ELISA kit. The enrichments used were 1) Listeria enrichment broth (LEB); 2) buffered LEB (BLEB); 3) BLEB transferred to the same enrichment after 24 h (BLEB) 24-h transfer); and 4) modified University of Vermont medium (UVM-1) transferred after 24 h to UVM-1 medium containing additional acriflavin (UVM-2). All 4 enrichments were incubated for a total of 48 h at 30°C. To determine the efficiency of each protocol, the recovery results were compared with those obtained by using a modified version of the Bacteriological Analytical Manual (BAM) cultural method, as described in the Federal Register of November 1, 1988. Statistical analysis showed that recovery of *Listeria* spp. using nonbuffered LEB for 48 h without transfer did not differ significantly from that obtained with the revised BAM method. AA

1133

Price (RJ). **Residue concerns in seafoods.** *Dairy, Food and Environmental Sanitation* 12(3): 1992: 139-143

This review article focuses on metal (As, Cd, Pb, Hg and Se), environmental contaminants (polychlorinated biphenyls, dioxin, polycyclic aromatic hydrocarbons) and chlorinated hydrocarbons pesticide (DDT, dieldrin, chlordane compounds, heptachlor, other pesticides) residues in seafoods. 23 references. SRA

Crabs

1134

Ripper (TE) and Hackney (CR). **Pasteurization of seafood: Potential for shelf-life extension and pathogen control.** *Food Technology* 46(12): 1992: 88, 90-94

This article focuses primarily on the principles associated with the pasteurization of crabmeat, destruction of pathogens, process considerations (cooling and storage, initial temp., F-value and

shelf-life, spoilage organism, microbial survivors), packaging, process verification, and quality factors (bluing, texture and flavour problems). CSA

Lobsters

1135
Wang (Z), Taylor (KDA) and Yan (X). **Studies on the protease activities in Norway lobster (*Nephrops norvegicus*) and their role in the phenolase activation process.** *Food Chemistry* 45(2): 1992: 111-116

Three protease separated from Norway lobster (*N. norvegicus*) heads and partially purified were designated as enzymes I, II and III. Enzymes I and II, showing multiple pH optima towards casein and being very similar in most aspects, were likely to be thiol protease. Enzyme III with a pH optimum around 8.2 towards casein was a metal dependent protease and involved in the phenolase activation process in the lobster. SD

Shrimps

1136
Motes (MLJr). **Incidence of *Listeria* spp. in shrimp, oysters and estuarine waters.** *Journal of Food Protection* 54(3): 1991: 170-173

A total of 227 samples, including oysters, shrimp and water was collected along the U.S. Gulf Coast and examined to determine the presence of *Listeria* spp. *Listeria* spp. were recovered more frequently from shrimp than from water but were not recovered from oysters. Recovery of *Listeria* spp. from shrimp and waters was improved at temp. less than or equal to 20°C; however, recovery was not affected by salinity or related to the fecal coliform standard for shellfish-growing waters. Although only 5% of the test samples were positive for *L. monocytogenes*, all *Listeria* positive shrimp contained *L. monocytogenes*. The incidence of *Listeria* spp. in shrimp was low; nevertheless, shrimp represent a potential source of *Listeria contamination to processing plants and their products.* AA

Fish

1137
El-Faer (MZ), Rawdah (TN), Attar (KM) and Arab (M). **Mineral and proximate composition of some commercially important fish of the Arabian Gulf.** *Food Chemistry* 45(2): 1992: 95-98

Finfish and shellfish showed 18 - 22% protein and < 3% lipid content. In finfish K was high followed by P, lower levels of Na, Mg and Ca while in shellfish Na was high. SD

1138
Botta (JR), Kennedy (KM), Kiceniuk (JW) and Legrow (J). **Importance of redfeed level, fish size and roe content to quality of roe capelin.** *International Journal of Food Science and Technology* 27(1): 1992: 93-98

The importance of various levels of redfeed, fish size, roe content, and length of storage at dockside while frozen, and during and after thawing, to the incidence of autolysis of the exterior of the visceral cavity of roe capelin were examined. Evaluations of 106,860 roe-capelin revealed that redfeed level, fish size, and roe content had little effect. The most important factors were frozen storage time and thawing time, followed by length of dockside storage. It was found that this aspect of the quality of roe-capelin could best be improved by reducing the times and temp. to which roe-capelin are exposed prior to freezing, during frozen storage, and during and after thawing. AA

1139
Satyamoorthy (K) and Ramananda Rao (D). **Threonine aldolase in fish muscle.** *Beverage and Food World* 19(4): 1992: 17-19

Threonine aldolase activity in some of the marine and fresh water fishes in fresh form immediately after capture and during low temp. storage were determined. Much variation in the enzymic activity was detected between 'dark' and 'white' muscle, gills, viscera and skin in one and the same species of fish. Effect of heating at various temp., pH, inorganic and organic chemical compounds on the enzymic activity were evaluated. AA

Catfish

1140
Huang (YW), Lillard (DA), Koehler (PE) and Eitenmiller (RR). **Chemical changes and sensory evaluation of channel catfish as affected by diet, packaging method and frozen storage.** *Journal of Food Quality* 15(2): 1992: 129-138

Fillets, from farm-raised channel catfish (*Ictalurum punctatus*) fed diets with various amounts of protein, were packaged in polyvinylidene chloride (PVDC) film over wrapping, vacuum packaging with Eva bag and vacuum skin packaging and stored at -28°C for 90 days. Neither the packaging nor protein content of diet had a significant effect on thiobarbituric acid and free fatty acid. Sensory analysis showed that

greasiness of cooked catfish was decreased as toughness of fillet texture increased. SD

Mackerels

1141
Sachindra (NM) and Sripathy (NV). **Effect of preservatives and sterilization of salt on microbiological quality of salted-dried mackerel.** *Indian Journal of Microbiology* 32(4): 1992: 463-468

Use of sodium benzoate and sodium acid phosphate with common salt in the preparation of salted-dried mackerel, does not alter the microbiological quality of fish at the salting stage but helps in reducing the total bacterial load and the staphylococcal count in the dried fish. Staphylococci, however, still remain the dominant flora in the dried fish. Commercial common salt does not seem to be contributory source to the dominant flora on salted-sundried mackerel. RH of storage does not show any significant effect on the microbial load of salted-dried mackerel, irrespective of presence or absence of preservatives. AA

Saithe

1142
Joly (A), Cottin (P), Han-Ching (L) and Ducastaing (A). **Trimethylamine N-oxide demethylase (TMAO-ase) of saithe (*Pollachius virens*) kidney: A study of some physicochemical and enzymic properties.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 261-267

TMAO-ase, an enzyme of economic importance in the fish industry can produce large amounts of formaldehyde even below freezing point. The resulting formaldehyde-protein interactions induce deleterious effects on the functional properties of frozen fish minces. Results showed differences in some of the physicochemical properties such as $T_{1}2$/denaturation and spectrophotometric characteristics (unusual absorption at α= 258 nm, related to the presence of DNA fragments). From structural point of view as evidenced by the elution profiles TMAO-ase activity seems to be constituted of high MW protein groups (20×10^6 and 2×10^5) closely associated with mixed micelles of phospholipids. BV

PROTEIN FOODS

1143
Jansen (GR). **Centrally processed weaning foods for use in developing countries.** *Food Reviews International* 8(3): 1992: 307-345

Following a brief introduction to the weaning period, breast-feeding and weaning practices in all regions of the developing world are reviewed. Weaning food developments, including compositional and processing alternatives, are then discussed in the context of nutritional requirements. Particular attention is devoted to various technologies to increase the energy density of weaning foods. Product specifications for weaning foods, as promulgated by the Codex Alimentarius Commission, are presented and discussed. Studies in which supplementary feeding programs have been evaluated are reviewed. The data discussed in this review suggest strongly that the timely introduction of properly prepared weaning foods has an important role to play in improving child survival and growth in developing world. Emphasis in this review is placed on the advantages of centrally processed weaning foods, but clearly home/village-prepared foods also have an important role to play. The review emphasized elementary principles of home sanitation in the proper use of weaning foods. 120 references. BV

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

1144
Russell (I) and Stewart (GG). **Contribution of yeast and immobilization technology to flavour development in fermented beverages.** *Food Technology* 46(11): 1992: 146, 148-150

The contribution of immobilized yeast cell technology with diacetyl control in the production of beer and wine used to overcome long fermentation and aging times encountered in traditional brewing and the applications of immobilized yeast in alcohol-free beer and champagne is discussed in this article. CSA

Beer

1145
Mohan (SB), Smith (L), Kemp (W) and Lyddiatt (A). **An immunochemical analysis of beer foam.** *Journal of the Institute of Brewing* 98(3): 1992: 187-192

Beer foam produced in a continuous foaming tower in volumes representative of commercial dispense, was analysed by immunoelectrophoretic and immunoblotting techniques to identify antigens involved in foam structural stability. In crossed immuno electrophoresis (CIE), only one antigen

precipitated from foam in the homologous foam antiserum. This antigen was shown to be of malt origin by rocket-line immunoeletrophoresis and was also present in 11 commercial beers (5 bitters, 4 lagers and 2 stouts). However, the foam preparation separated into more than 20 polypeptides by SDS polyacrylamide gel electrophoresis. Immunoblotting showed that at least 12 of these reacted with foam antiserum and that they originated from either malt or yeast. Similar polypeptides were also identified in the antigen precipitated in CIE, suggesting that these polypeptides were probably present in the foam as a complex. It is concluded that the stability of foam reflected molecular interactions between these polypepetides (and possibly other components such as carbohydrates) in the liquid film of the bubble structure. AA

1146

St. John Coghlan (D), Woodrow (J), Bamforth (CW) and Hinchliffe (E). **Polypeptides with enhanced foam potential.** *Journal of the Institute of Brewing* 98(3); 1992; 207-213

The ability of beer to produce a good foam is strongly influenced by the level of foam active polypeptides. It has previously been proposed that a means of ensuring an adequate level of such species is to add an exogenous preparation of foam active protein. One such preparation, hydrolysed liquid egg white (HLEW), has been shown to impart a good foam to beer with substandard foam performed, without detriment to product quality. The foam active properties of this material are the subject of the work described. HLEW was characterised by a combination of reverse phase chromatography and polyacrylamide gel electrophoresis to reveal a heterogeneous mixture of low mol. wt. (2100 - 6000 daltons) relatively hydrophilic polypeptides. When this material was subjected to foaming and the foam positive and foam negative fractions similarly characterized, it was apparent that the foam positive fraction consisted almost exclusively of hydrophobic polypeptides. Accordingly, preparative reverse phase chromatography was used to isolate foam active fractions from the hydrophobic species present. These fractions were subsequently subjected to both functional and physical characterisation. It was apparent from a small-scale Rudin test that the foam activity per unit dry wt. of protein was enhanced in the foam active fractions; in one case an enhancement of 2 fold greater than the HLEW itself was observed. Moreover, upon addition to beer a positive effect on HRV was achieved with as little as 0.0025 mg protein/ml beer. Physical characterisation of the foam active material revealed the presence of tightly bound polypeptide aggregates which could only be separated by the use of protein denaturing agents. AA

1147

Moir (M). **The desideratum for flavour control.** *Journal of the Institute of Brewing* 98(3): 1992: 215-220

Recent progress towards understanding the contributions of raw materials and processing conditions to the aroma and taste of beer is reviewed. 31 references. BV

Wines

1148

Adsule (RW), Kotecha (PM) and Kadam (SS). **Preparation of wine from pomegranate.** *Beverage and Food World* 19(4): 1992; 13-14

Juice from fresh pomegranate fruits (var. Ganesh) was extracted and fermented using *Saccharomyces cerevisiae* var. *ellipsiodeus*. The rate of fermentation of juice was slower than that of grape juice. The sensory evaluation of pomegranate wine (PW) showed better colour, taste and less astringency than the grape wine (GW). The cost of production of wine from pomegranate juice (PJ) was relatively higher than that of GW. Considering the good sensory properties of PW and the seasonal glut of pomegranate in the market, fermentation of PJ may open new avenues for better marketing and utilization of pomegranate. BV

Non-alcoholic beverages

Cocktails

1149

Bhatia (AK), Singh (RP) and Gupta (AK). **Juice cocktails from tropical fruits and tart apples.** *Beverage and Food World* 16(4): 1992; 22-23

An investigation carried out to explore the possibility of blending tart apple juice with other fruit juices to have acceptable taste and aroma is reported. Results indicate that juice from tart fruits yields an acceptable blend with juice of orange and malta in the ratio of 1:1 and fairly acceptable in the ratio of 1:2. Highly acceptable blends with these fruits were produced after the sugar was adjusted to 14°CBrix. Apple, apricot and apple, dry apricot yield fairly acceptable juice cocktails and provide scope to utilise these fruits for commercial exploitation. BV

Fruit juices

Apricot juices

1150

Manan (JK), Kulkarni (SG) and Shukla (IC). **Studies on preparation and storage of pulp, squash, nectar and ready-to-serve beverages from two varieties of apricot (Gola and Chapta) grown in Kumaon region of Uttar Pradesh.** *Beverage and Food World* 19(4); 1992; 9-12

Ready-to-serve apricot beverage could be prepared from the pulp of 'Gola' and 'Chapta' (Descendants of 'Royal' and 'Moorpark' var.) var. of apricot which were not fit for table purpose on account of their high acid contents, small size, etc. The RTS beverage with acceptable sensory quality attributes was prepared from pulp preserved by (a) pre-heating (heat processed) and (b) using 547 p.p.m. sulphur-dioxide which is well within the permissible limits. Storage studies on apricot pulp has shown that the pulp quality was satisfactory upto 9 months storage at room temp. (13 - 43°C). Nectars and squashes were also prepared and adjudged satisfactory upto 6 months storage. AA

Kinnow mandarin juices

1151

Ranote (PS), Saini (SPS) and Bawa (AS). **Evaluation of thermal process and shelf-life of Kinnow juice.** *Journal of Food Science and Technology (India)* 30(2): 1993; 88-91

The slowest heating point was found to be at the geometric centre and at 1/10th of the height from the bottom along vertical axis for pouched and bottled Kinnow juice. The thermal processing time on the basis of pectinmethyl esterase inactivation was 28.3 and 17.0 min for bottles and pouched juice, respectively. Invert sugars increased, while total sugars declined with storage under ambient conditions. Cans, being opaque to light, retained higher amounts of ascorbic acid during storage. Various sensory attributes were significantly affected by types of packaging containers and storage. AA

Orange juices

1152

Peleg (H), Naim (M), Zehavi (U), Rouseff (RL) and Nagy (S). **Pathways of 4-vinylguaiacol formation from ferulic acid in model solutions of orange juice.** *Journal of Agricultural and Food Chemistry* 40(5): 1992; 764-767

4-Vinylguaiacol (PVG), a major off-flavour in citrus products, was detected in stored model sol. of orange juice (MOJ) containing ferulic acid, and its amount increased with time and temp. PVG was not found in MOJ incubated without ferulic acid. Vanillin, another ferulic acid degradation product, was also detected in MOJ containing ferulic acid after incubation at 35 and 45°C, but only minute amounts occurred at 25°C. Vanillin was not produced, however, in MOJ incubated with added PVG but which did not contain ferulic acid. Incubation of MOJ under nitrogen atm. rather than air or including BHT did not affect PVG levels even though nonenzymic browning products such as 5-(hydroxymethyl)furfural and furfural, and optical density values were reduced. Cu ions accelerated browning but decreased PVG levels. It appears that different factors affect PVG formation and sugar degradation. AA

Prune juices

1153

van Gorsel (H), Li (C), Kerbel (EL), Smits (M) and Kader (AA). **Compositional characterization of prune juice.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 784-789

Processed juices from dried prunes with or without pulp, juice from prune conc., and the juices of fresh prune and 9 other fruits were analyzed for anthocyanins, organic acids, sugars, phenolic compounds, and amino acids. Unique characteristics of processed prune juice were the predominance of α-aminobutyric acid, citrulline, taurine, O-phosphoethanolamine, and quinic acid and the absence of anthocyanins, (-)-epicatechin, phloridizin, and citric and tartaric acids. Comprehensive measurements of sugars, anthocyanins, nonvolatile acids, phenolic compounds, and amino acids made it possible to distinguish processed prune juices from fresh prune juice and the juices of plum, cherry, nectarine, peach, apple, pear, grape, kiwifruit, and strawberry fruits. AA

Tangerine juices

1154

Noomhorm (A) and Kasemsuksakul (N). **Effect of maturity and processing on bitter compounds in Thai tangerine juice.** *International Journal of Food Science and Technology* 27(1): 1992: 65-72

Optimum conditions of fruit maturity and processing for improved quality of Thai tangerine fruit juice were evaluated. Limonin and naringin components causing bitterness, acidity, total soluble solids and vitamin C were quantified in

specified fruit setting and processing conditions. Higher limonin contents were observed in tangerine fruits harvested early in the season of 1989, whereas naringin contents gradually decreased with maturity. The optimum harvesting time for Thai tangerine fruit which meets the worldwide quality indicators of extracted juice was 9 months after fruit set. Low temp. storage of tangerine juice was only effective in delaying limonin formation if not pasteurized, which results in higher limonin concn. at the start of the storage period. However, naringin concn. of tangerine juice were not affected by storage conditions and the pasteurization process. Lower extraction pressure of juice resulted in low limonin and naringin concn. AA

Teas

1155

Ohtsuru (M), Nishimura (K), Makita (T), Yayabe (F) and Kakuda (T). **Biochemical examination of the effect of chronic oolong tea consumption in the rabbit.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(7): 1991: 626-628 (Ja)

Three groups of rabbits were given water, normal oolong tea or strong oolong tea. There were no significant differences in the various indices for lipid metabolism and those related to the liver and pancreas functions in the blood serum among the groups of animals at 130 days of the experimental period. It was sugge4ted that chronic consumption of oolong tea was in no way harmful at least in this animal species at the dosages employed in the present study. AA

1156

Mahanta (PK) and Baruah (HK). **Theaflavin pigment formation and polyphenol oxidase activity as criteria of fermentation in orthodox and CTC teas.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 860-863

Depending upon the condition of traditional method of black tea manufacturing, polyphenol oxidase (PPO) activity pigment profiles together with a possible mechanism that could operate during the polyphasic conditions of tea processing were studied simultaneously in 3 types of fermented leaves. Theaflavins, the most desirable pigments having a benztropolone moiety, and unstable o-quinones, which generated by PPO, were analyzed by HPLC. Furthermore, the oxidation rates of 2 methods of black tea processing, orthodox and curl, tear, crush, were monitored in an oxygraph fitted with a clark-type electrode, and the role of technology on the quality of the black tea beverage is discussed. AA

1157

Owuor (PO). **Comparison of gas chromatographic volatile profiling methods for assessing the flavour quality of Kenyan black teas.** *Journal of the Science of Food and Agriculture* 59(2): 1992: 189-197

A comparison was made of the relationship between the ratios and sensory evaluation scores of Kenyan clonal CTC black teas and orthodox black teas from different var. GS

FATS AND OILS

1158

Nice (DJ) and Robinson (DS). **Inhibition of lipid autoxidation by bovine superoxide dismutase.** *Food Chemistry* 45(2): 1992: 99-103

For autoxidation, the initiation reactions, which are supposed to form hydroxyl reactions, are inhibited by superoxide dismutase (SOD) but not the soybean lipoxygenase types I, IV and V in model systems containing linoleic acid. SOD reduced the autoxidation in a low-Fe model system and also inhibits the rapid autoxidation in the presence of haemin. SOD mainly prevents the formation of hydroxyl radicals during the Fe-catalysed oxidation of linoleic acid with the possibility that the enzyme might inhibit haemin-catalysed oxidation by scavenging an oxy-haem complex. SD

Fats

1159

Sridhar (R), Lakshminarayana (G) and Kaimal (TNB). **Modification of selected Indian vegetable fats into cocoa butter substitutes by lipase-catalyzed ester interchange.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 726-730

A few solid and semi-solid fats of tree origin in India, namely sal (*Shorea robusta*), kokum (*Garcinia indica*), mahua (*Madhuca latifolia*), dhupa (*Vateria indica*) and mango (*Mangifera indica*), were chosen for modification into cocoa butter substitutes by lipase-catalyzed ester interchange with methyl palmitate and/or stearate. Hexane sol. of mixtures of fat and methyl ester(s) in various molar proportions were passed through a column of Lipozyme™, a lipase from *Mucor miehei* immobilized on a macroparticulate ion-exchange resin. The interesterified fats were purified by extraction with 95% ethanol followed by silica column chromatography. Interesterified dhupa, kokum and

sal fats compared well with cocoa butter in the total fatty acid composition and the 2-position of triacylglycerols, as well as glyceride composition. In particular, interesterified kokum fat resembled cocoa butter well in solid fat content and peak melting temp. as determined by differential scanning calorimetry. AA

1160

Kashulines (P), Rizvil (SSH), Harriott (P) and Zollweg (JA). **Viscosities of fatty acids and methylated fatty acids saturated with supercritical carbon dioxide.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991: 912-921

The viscosities of several types of lipids saturated with supercritical carbon dioxide (SC-CO_2) were measured with a high-pressure capillary viscometer. Oleic acid and linoleic acid were evaluated from 85 to 350 bar at 40 and 60°C. The more SC-CO_2-soluble methylated derivatives of these fatty acids were evaluated from 90 to 170 bar at 40 and 60°C. The complex mixture of anhydrous milk fat (AMF) was evaluated from 100-310 bar at 40°C. The viscosities of the methylated fatty acids saturated with SC-CO_2 decreased between 5 and 10 times when the pressure increased from 1 to 80 bar, followed by a further decrease by a factor of 2 to 3 when the pressure was increased from 80 to 180 bar. The viscosities of the fatty acids and AMF saturated with SC-CO_2 had viscosity reduction similar to the methylated fatty acids between 1 and 80 bar, but they decreased much less between 80 and 350 bar. At constant pressure, the viscosity of the fatty acids and AMF decreased with increasing temp., whereas the viscosity of the methylated fatty acids increased with increasing temp. The lipid/SC-CO_2 mixtures were Newtonian, and their viscosities were best interpreted by using the mass concn. of dissolved SC-CO_2 in the lipids and the pure component viscosities. AA

1161

Lie (E) and Molin (G). **Esterification of polyunsaturated fatty acids with lipases from different sources.** *International Journal of Food Science and Technology* 27(1): 1992: 73-76

Enzymatically catalyzed esterification between glycerol and polyunsaturated fatty acids were studied for 6 lipases of different biological origin. Most efficient was lipase from *Mucor miehei* (yeast) and *Chromobacterium viscosum* (bacterium) which incorporated free fatty acids in the glycerol to 75% and 80%, respectively. Both lipases showed a slight preference for oleic acid. *M. miehei* lipase incorporated eicosapentaenoic acid at the same level as the acid occurred in the free fatty acid fraction while *C. viscosum* lipase incorporated the acid at a lesser level. Both lipases esterified less docosahexaenoic acid. AA

Oils

1162

Miyashita (K), Kanda (K) and Takagi (T). **A simple and quick determination of aldehydes in autoxidized vegetable and fish oils.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 748-751

A simple and quick method for quantitative aldehyde detn. by using N,N-dimethyl-p-phenylenediamine as reagent is reported. BV

1163

Mukhopadhyay (SB), Gupta (PK) and Basu (AK). **Bleaching of cottonseed and soybean oils by hydrogen generated *in situ*.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 791

Bleaching of cottonseed and soybean oils has been effected by hydrogen generated *in situ* by the action of aqueous $CuSO_4$ sol. on Zn dust. Yellow colour bodies are bleached more readily by this process than the red bodies. Colour reduction up to a level of 70 - 74% is attainable by this method. AA

1164

Reynhoul (G). **The effect of temperature on the induction time of a stabilized oil.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991: 983-984

Soybean oil was fortified with the antioxidants BHT, BHA, TBHQ, rosemary extract (Herbalox^R Seasoning) and tocopherol. Induction times were determined against a control on each sample in a Metrohm Rancimat over a temp. range of 80°C to 180°C. A linear effect of the data was obtained when the log of induction time was plotted against temp. The Metrohm Rancimat was found to be capable of determining induction times within the range of 0.5 to 70 h. AA

Canola oils

1165

D'Souza (V), deMan (L) and deMan (JM). **Polymorphic behaviour of high-melting glycerides from hydrogenated canola oil.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991: 907-911

Canola oil was hydrogenated with a commercial Ni catalyst at 175°C and 15 psi hydrogen pressure.

Samples were taken during the reaction starting at 15 min and thereafter at 10-min intervals. The reaction was stopped after 2 h. The high-melting glycerides (HMG) were obtained by fractional crystallization at 15°C with acetone as solvent. The HMG were analyzed for fatty acid and triglyceride composition by GLC and *trans* was determined by infrared spectroscopy. In the first 45 min of hydrogenation of canola oil, the 18:0 fatty acid increased at a low rate while the *trans* fatty acid content increased at a much faster rate. The 16:0 and 18:0 content of the HMG was highest and *trans* content the lowest during the period in which the triglyceride composition was the most diverse. The 54-carbon triglyceride content of the HMG increased from 64% to 78% during the 2 h of hydrogenation. The short spacings for the HMG showed the presence of β crystals as well as several intermediate forms. Yhe number of short spacings increased with hydrogenation time. The differential scanning calorimetry (DSC) melting profile of the HMG showed one broad peak between 20 and 30°C and 2 peaks around 60°C and above. Crystallization temp. of the HMG were in the range of 40 - 45°. AA

1166

Ramamurthi (S), Bhirud (PR) and McCurdy (AR). **Enzymatic methylation of canola oil deodorizer distillate.** *Journal of the Association of Official Analytical Chemists* 68(12); 1991; 970-975

Methylation of canola oil deodorizer distillate catalyzed by a nonspecific lipase was investigated. The conversion of fatty acids to methyl esters has been optimized by using a statistical design. Up to 96.5% conversion of fatty acids to their methyl esters has been achieved without the aid of vacuum or any water-removing agent. The effects of temp., ratio of the reactants (methanol:fatty acids in the deodorizer distillate) and enzyme concn. on the equilibrium conversion were studied. The temp. and ratio of the reactants showed a significant effect on the conversion of fatty acids to methyl esters and they exhibited a strong interactive effect. Enzyme concn. in the range of 2.7% to 4.3% did not show a significant effect on the equilibrium conversion of fatty acids. Greater than 95% conversion of fatty acids to methyl esters was achieved at temp. around 50°C and at a ratio of the reactants between 1.8 and 2.0. The inhibitory effect of hydrophilic methanol on the enzyme activity was largely reduced by working at the lower temp. range (around 50°C). AA

Coconut oils

1167

Baltasar (SF). **Coconut oil extraction employing the dry processing technology.** *Indian Coconut Journal* 23(3); 1992; 15-17

Various stages (the preparation of raw material, drying or cooking, feeding the expeller presses, handling and filtering of crude oil, oil cooling system and extraction by the solvent method) involved in the extraction of oil from copra by means of mechanical screw presses or the combination of expeller and solvent processes are discussed in this article. CSA

Mahua oils

1168

Kotwal (DS), Vali (SA) and Shastri (NV). **Physico-chemical and biological properties of raw and used *Mahua* oil.** *Journal of Food Science and Technology (India)* 30(2); 1993; 100-104

Groundnut oil (GNO) and *Mahua* oil (MO) were heated at 180°C for 8 h both with and without intermittant frying of 'fryums' (a commercial ready-to-fry snack). Thermal degradation as measured by changes in colour development, viscosity, smoke point, acid value, peroxide value, iodine value and conjugated diene hydroperoxide values (CDHP) were found to be higher in MO than in GNO. Albino rats of either sex fed on diets with raw MO for a period of three months showed good growth and were found to be comparable to raw GNO diets. Intake of used (heated and fried) MO and GNO adversely affected the food intake and consequently wt. gain of female rats. Rats of either sex fed on heated GNO exhibited normal histology, while heated MO fed rats showed moderate hepatic hypertrophy, with only one rate out of 4 exhibiting unilateral atrophic testicular damage. Fried GNO and MO showed more damage to liver of the male rats, while the kidneys and ovaries of all the rats fed either raw or used GNO and MO depicted normal histological picture. AA

Rice bran oils

1169

Sarkar (S) and Bhattacharyya (DK). **Nutrition of rice bran oil in relation to its purification.** *Journal of the Association of Official Analytical Chemists* 68(12); 1991; 956-962

A comparative nutritive study was made to show that the extent of purification markedly influences the nutritive characteristics of rice bran oil. The coeff. of digestibility was 93.8% when rice bran oil that had been purified by degumming, deacidifying, bleaching and deodorizing was fed to rats; whereas it was 94.8% when extremely pure rice bran oil, which was achieved by including an additional dewaxing step, was used. Rice bran oil without deodorization, but purified by other treatments,

showed a 96.2% coeff. of digestibility, which is somewhat lower than that of groundnut oil. However, after a feeding experiment over 3 months, the highly purified rice bran oil showed better results than the other two purified samples of rice bran oil, and was sometimes better than groundnut oil in terms of total lipid, triglyceride and especially in cholesterol content in serum, liver and heart tissues. AA

Soybean oils

1170

Endo (Y), Endo (H), Fujimoto (K) and Kaneda (T). **Minor components responsible for flavour reversion of soybean oil.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 769-771

Unusual triglycerides consisting of 10-oxo-8-octadecenoic acid and 10- and 9-hydroxy octadecanoic acids were detected in edible refined, bleached and deodorized, and crude soybean oils which may be responsible for flavour reversion. BV

SPICES AND CONDIMENTS

Essential oils

1171

Ramachandraiah (OS), Azzemoddin (G), Thirumala Rao (SD), Padmakumari (KP) and Narayana (CS). **Composition of essential oil from flower buds of "Nagakesar" (*Mammea longifolia*, Planch).** *The Pafai Journal* 14(1): 1992: 33-34

Mammea longifolia Planch (*Clusiaceae*)popularly known as "Nagakesar" is a tree found in South-Western India. Flower buds of Nagakesar on hydro/steam distillation yields 0.8% of essential oils (EO). Extraction of flower buds with n-hexane followed by its steam-distillation of the resulting oleoresin yielded 1.2% of EO. The physico-chemical characteristics of the oil are: sp. gr. 0.9125/30°C, refractive index at 40°C, 1.4870, optically inactive, acid value 0.5, ester value 8.0, evaporation residue 30.4%, soluble in 95% alcohol in 1:1 ratio. The EO is light yellow in colour and has pleasant spicy odour with a warm and sweet aroma. Chemical constituents of the oil identified are: sesquiterpene hydrocarbons (30.56%), guaiene (12.7%), linalool (7.3%), elemol (6.28%), α-copaene (3.36%), β-caryophylene (1.39%), α-pinene (0.92%), camphene (0.41%), β-pinene (0.29%), limonene (0.61%) and p-cymene (0.34%). Dried buds are used as substitutes to cloves in making *pan masala* and extensively used in culinary for fine flavour and aroma in foods and food additives. BV

Olives

1172

Tsimidou (M), Papadopoulos (G) and Boskou (D). **Phenolic compounds and stability of virgin olive oil: Part I.** *Food Chemistry* 45(2): 1992: 141-144

Total phenol content and individual phenols of 24 Greek virgin olive oil samples were analysed by reversed phase HPLC. Total polyphenol content and hydroxtyrosol-to-tyrosol ratio showed significant linear correlation with resistance of the oil to autoxidation. Tyrosol the major olive oil phenol did not correlate with the shelf-life. SD

Pickles

1173

Oda (N) and Sawada (K). **Use of liquid part of fermented pickles as seasoning liquid and its preservation quality.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991: 687-690 (Ja)

A liquid part of fermented Kabuzuke was used as seasoning liquid of fresh turnips. The quantity of main organic acids of turnips pickled in this clear liquid for 48 h at 4°C was almost the same of fermented turnips. Colonies of several kinds of bacteria decreased in order from 10^7 - 10^4 cells/ml to below 10^2/ml after 72 h. When stored at 25°C, turbidity of this clear liquid increased with in short period, but at 4°C, did not increase for a month. In conclusion, this liquid part may be useful as a seasoning liquid of pickle. AA

Spices

Chillies

1174

Jang (J-J), Devor (DE), Logsdon (DL) and Ward (JM). **A 4-week feeding study of ground red chilli (*Capsicum annum*) in male B6C3F$_1$ mice.** *Food and Chemical Toxicology* 30(9): 1992: 783-787

The toxicity of red chilli was examined in male B6C3F$_1$ mice fed a commercial meal diet mixed with ground *Capsicum annum* (Linn.) at levels of 0.5, 1.0, 2.5, 5.0, 7.5 and 10% by wt. Mice were offered control or test diets *ad lib.* starting at 6 wk of age. Food consumption was measured daily and individual body wts. recorded weekly for the 4-wk feeding period. General health, body wt. and food intake were apparently not adversely affected at any level of pepper consumption. Histopathological

evaluation revealed slight glycogen depletion and anisocytosis of hepatocytes in the 10% group. However, other organs did not reveal any lesions attributable to the chilli exposure. It appears that red chilli is relatively non-toxic at the doses tested in male $B6C3F_1$ mice. AA

Garlic

1175

Yan (X), Wang (Z) and Barlon (P). **Quantitative estimation of garlic oil content in garlic oil based health products.** *Food Chemistry* 45(2): 1992: 135-139

Three major sulphides (diallyl disulphide, allyl methyl trisulphide and diallyl trisulphide) contributing about 600 mg g^{-1} in the oil were analysed by a GLC procedure using C_{18} cartridge liquid solid phase extraction. The garlic oil based health products showed a very similar sulphide profile to that of pure oil and so that the oil content in these products were estimated by relating individual sulphide wt. % in the products to their composition in the oil. The estimation is useful to check the manufacturer's oil content claims. SD

Marjoram

1176

Komaitis (ME), Ifanti-papatragianni (N) and Melissari-Panagiotou (E). **Composition of the essential oil of marjoram (*Origanum majorana* L.).** *Food Chemistry* 45(2): 1992: 117-118

A total of 45 compounds were identified by GLC and GC-MS analysis: the most prominent being 4-terpineol (37%) and three other substances firstly in the marjoran oils. SD

SENSORY EVALUATION

1177

Wakeling (IN), Raats (MM) and Mactie (HJH). **A new significance test for consensus in generalized procrustes analysis.** *Journal of Sensory Studies* 7(2): 1992: 91-96

Generalised Procrustes Analysis, used to assess the sensory panel consensus and to which is fit goodness of fit based on Monte-Carlo simulations, has been modified into a more powerful test and also in a way to retain the original assessor configurations by permutation of data rows. SD

1178

Piggott (JR) and Watson (MP). **A comparison of free-choice profiling and the repertory grid method in the flavour profiling of cider.** *Journal of Sensory Studies* 7(2): 1992: 133-145

A group of trained and untrained assessors described the sensory properties of 25 ciders. Generalised Procrustes analyses of the two data sets provided broadly similar results but the repertory grid method yielded more descriptors and interpretation of the resulting product space was slightly easier. The methods were only comparable. SD

1179

Lundahl (DS). **Comparing time-intensity to category scales in sensory evaluation.** *Food Technology* 46(11): 1992: 98-103

Study evaluating strawberry juice for sweetness, sourness, bitterness and astringency found that time-intensity measurements provided more information on sample differences than category scaling. CSA

1180

Cardello (AV) and Sawyer (FM). **Effects of disconfirmed consumer expectations on food acceptability.** *Journal of Sensory Studies* 7(4): 1992: 253-277

Three studies were conducted to assess the effects of disconfirmed consumer expectation on food acceptability. In the first, disconfirmed expectations for the sensory attributes of an edible film had a negative effect on acceptability of the film. Greater disconfirmation resulted in lower acceptance and purchase intent. In the second study, written product information was used to establish 3 levels of expected acceptability and expected bitterness for a novel fruit beverage. Comparison of preexposure (expected) and postexposure (perceived) ratings of acceptability and bitterness supported an assimilation model of disconfirmation effects for conditions in which expectations of acceptability were high and expectations of bitterness were low. A contrast effect was observed for bitterness judgements when expectation of bitterness were high. Associative effects resulting from the expectation manipulation were observed on other sensory attributes. In the third study, expectation were manipulated to influence both direction (positive versus negative) and degree of disconfirmation for the acceptance of cola beverages. Results provided further support for an assimilation model of these effects. AA

1181

Cliff (M) and Heymann (H). **Descriptive analysis of oral pungency.** *Journal of Sensory Studies* 7(4): 1992: 279-290

Four pungent qualities viz. burning, tingling, numbing, overall, two temporal qualities viz., lag time, overall duration and three spatial qualities viz., longitudinal location, lateral location, localized/diffuse of pungent principles viz., capsiacin, piperine, cinnamaldehyde, cuminaldehyde, cinnamaldehyde, having quick onset and rapid decay, was primarily burning and tingling; that of eugenol, a long-lasting predominantly numbing effect; that of piperine, capsaicin and ginger, having different temporal and spatial responses, primarily burning; that of ethanol, having the shortest perceived onset and overall duration, most diffuse and that of cuminaldehyde equally burning, tingling and numbing. SD

1182

Irwin (RJ), Hautus (MJ) and Stillman (JA). **Use of the receiver operating characteristic in the study of taste perception.** *Journal of Sensory Studies* 7(4): 1992: 291-314

The review on receiver operating characteristic (ROC) for taste confirms that its model is normal-normal equal variance of signal detection theory. Standard error of ROC parameters is useful since taste test trials are always a small number. Methods for estimating standard errors and area measure PCA are also presented. 33 references. SD

FOOD STORAGE

1183

Agarwal (US) and Gupta (DK). **Change in weight of stored agricultural products due to change in moisture content.** *Bulletin of Grain Technology* 29(2): 1991: 108-112

Appropriate formulae and ready reckoners developed for estimating the wt. change and the changed wt. of the agricultural products for moisture variations of 7 - 20% (wb), are presented. Agricultural marketing, processing and storage agenicies can make use of the same. GS

INFESTATION CONTROL AND PESTICIDES

1184

Khanna (SC) and Yadav (TD). **Ovicidal efficacy of methyl bromide and phosphine against insect pests of stored products.** *Bulletin of Grain Technology* 29(2): 1991: 79-83

Ovicidal efficacy of methyl bromide (MB) and phosphine against 24 - 48 h old eggs of *Ephestia cautella* (Walk), *Corcyra cephalonica* (Staint), *Trogoderma granarium* (Everts), *Callosobruchus maculatus* (Fab), *C. chinensis* (Linn.) and 0 -48 h old eggs of *Sitophilus oryzae* (L) was tested. *C. chinensis* proved most susceptible to both the fumigants; *E. cautella* least to MB and *Cor. cephalonica* least to phosphine. GS

1185

Chiranjeevi (CH). **Efficacy of some indigenous plant materials and ashes on the percentage of damaged grains, percentage of protection and viability of green gram seed infested by pulse beetle *Callosobruchus* chinensis. *(L.)*.** *Bulletin of Grain Technology* 29(2): 1991: 84-88

Efficacy of leaf powders of neem (*Azadirachta indica*), apamarga (*Achyranthus aspera*, kesarachettu (*Crinum defixum*), lantana (*Lentana camara*), rhizome powder of sweet flag (*Acorus calamus*), seed powder of neem, ashes of cowdung, acacia wood, neem wood and casuarina on the % of protection and viability of treated seed, was studied. Cowdung ash was most effective in damage reduction and infestation over control, followed by neem seed powder, sweet flag rhizome powder and neem leaf powder. Treatments did not affect seed germination. GS

BIOCHEMISTRY AND NUTRITION

1186

Dodd (NS) and Swaroop Dighe. **Iodine content of diets of the people of different regions living in Bombay.** *Journal of Food Science and Technology (India)* 30(2): 1993: 134-136

Total daily iodine intake of 100 women from ten different regions, living in Bombay, ranged from 211 - 301 meg. Nearly 15.3 - 42.0% of iodine was contributed by the daily salt intake. Iodine losses during cooking ranged from 37.4 - 69.7%. AA

1187

Collier (PD), Cromie (DDO) and Davies (AP). **Mechanism of formation of chloropropanols present in protein hydrolysates.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 785-790

Chloropropanols are formed in protein hydrolysates by the reaction of the HCl acid with residual lipids

associated with the proteinaceous materials used in their production. The products formed from glycerol, triolein, 1,2-diacyl-*sn*-glycero-3-phosphorylcholine and soya meal have been analyzed by thin-layer and GC. The yields and isomer ratios of the chloropropandiols and dichloropropanols formed are interpreted in terms of reaction mechanisms for their formation, which involve preferential nucleophilic substitution by the chloride anion at positions activated by neighboring ester groups. These provide anchimeric assistance and govern regioselectivity through steric and electronic effects. AA

1188

Martinez (VM), Newman (RK) and Nenman (CW). **Barley diets with different fat sources have hypocholesterolemic effects in chicks.** *Journal of Nutrition* 122(5): 1992: 1070-1076

Broiler chicks were fed isonitrogenous diets containing 23% protein, 11.4% dietary fibre and 10% dietary fat for 17 days. Diets contained 60% hull-less barley or red spring wheat, with either palm oil, dehydrated egg yolk, butter, tallow or corn oil. Wheat-fed chicks grew faster, showed greater food efficiency and higher liver cholesterol concn. Barley-fed chicks showed lower total plasma cholesterol concn. (3.1 - 4.0 mmol/L), higher fecal crude fat and lower excreta DM. Chicks fed palm oil with wheat showed the highest total cholesterol, 11.3 mmol/L. High soluble fibre of barley was found to exert a hypocholesterolemic effect in chicks irrespective of dietary fat source, possibly mediated through lowered fat absorption. SD

1189

Nakamura (S), Kato (A) and Kobayashi (K). **Bifunctional lysozyme - galactomannan conjugate having excellent emulsifying properties and bactericidal effect.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 735-739

Lysozyme-galactomannan conjugate prepared through controlled Maillard reaction revealed excellent emulsifying properties and antimicrobial properties. The lytic activity of the conjugate remained about 80% that of native lysozyme when measured by using *Micrococcus lysodeikticus* as a substrate. The emulsifying properties of the conjugate were superior to those of commercial emulsifiers. The emulsifying activity and stability of the lysozyme-galactomannan conjugate were not affected in the presence of 0.2 M NaCl and in acidic pH, while those of commercial emulsifiers were decreased. In addition, the lysozyme-galactomannan conjugate exhibited a lethal antimicrobial effect against Gram-negative bacteria. AA

1190

Decker (EA), Crum (AD) and Calvert (JT). **Differences in the antioxidant mechanism of carnosine in the presence of copper and iron.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 756-759

Carnosine is a β-alanythistidine dipeptide found in skeletal muscle. Carnosine (1.0 - 25 mM) is capable of inhibiting Cu- and Fe-catalyzed oxidation of phosphatidylcholine liposomes as measured by thiobarbituric acid reactive substances (TBARS) and lipid peroxides. The ability of 5 mM carnosine to inhibit the formation of TBARS and lipid peroxides and lipid peroxides was 2.5- and 8.8-fold higher, respectively, for Cu- than Fe-catalyzed lipid oxidation. Carnosine (0.05 - 10.0 mM) is capable of inhibiting Cu-catalyzed oxidation of ascrobic acid but was ineffective at preventing Fe-catalyzed ascorbate oxidation. Carnosine inhibits Fe-dependent microsomal lipid oxidation but does not inhibit the oxidation of NADPH by the enzyme system. ^{1}H NMR spectra of carnosine show peak broadening in the presence of Cu but not Fe. These data suggest that carnosine forms a complex with Cu which decreases its catalytic activity; however, carnosine does not form a complex with Fe. AA

1191

Hardinge (F) and Hardinge (M). **The vegetarian perspective and the food industry.** *Food Technology* 46(10): 1992: 114, 116, 121

Research on vegetarian diets based on nutrient groups (protein, animal fat, cholesterol and dietary fiber) and large-scale studies, the response of the food industry to the research and the challenges to be faced by the food industry are the aspects dealt in this article. CSA

1192

Nestel (PJ). **How does the fat we eat affect our risk of heart disease ?.** *Food Australia* 44(8): 1992: 377-378

This review summarizes the evidence and proposes the optimal dietary mix. Aspects covered include, dietary fat (amount, type of fat), dietary cholesterol, fat soluble antioxidants, and recommendations. 6 references. SRA

1193

Mills (ENC), Alcocer (MJC) and Morgan (MRA). **Biochemical interactions of food-derived**

peptides. *Trends in Food Science and Technology* 3(3): 1992: 64-68

The structural aspects of peptide chemistry and its application to the study of food-derived peptides are reviewed. Physiologically active peptides, their immunogenicity, enzyme-linked immunosorbent assays are covered with reference to food intolerance. 20 references. GS

TOXICOLOGY

1194

Houben (GF), Abma (PMH), Van Den Berg (H), Van Dokkum (W), Van Loveren (H), Penninks (AH), Seinen (W), Spanhaak (S), Vos (JG), Ockhuizen (Th). **Effects of the colour additive caramel colour III on the immune system: A study with human volunteers.** *Food and Chemical Toxicology* 30(9): 1992: 749-757

Administration of the colour additive Caramel Colour III to rats has been associated with decreased numbers of lymphocytes and several other changes in the immune system, as well as in immune function parameters, specifically in animals fed a diet with a relatively low vitamin B_6 content. The effects are caused by the imidazole derivative 2-acetyl-4(5)-tetrahydroxybutylimidazole (THI). Caramel Colour III is commonly used in food products such as bakery products, soybean sauces, brown sauces, gravies, soup aromas, brown (dehydrated soups, brown malt caramel blend for various applications, vinegars and beers, and effects in humans on dietary intake cannot be excluded. Elderly male volunteers with a marginal deficit in vitamin B_6 were considered a relevant and potentially sensitive group to study possible effects of Caramel Colour III on blood lymphocyte numbers (total and within subsets) or on proliferative responses of lymphocytes to mitogenic stimulation. In addition, several other haematological parameters, as well as serum immunoglobulin levels and immunoglobulin production *in vitro* by pokeweed mitogen-stimulated mononuclear blood cells were studied. The results of this double-blind intervention study demonstrated that in a selected test group of apparently healthy elderly male volunteers with a biochemically marginally deficient vitamin B_6 status, Caramel Colour III containing 23 (commercial sample) or 143 (research sample) p.p.m. THI and administered at the level of the current acceptable daily intake of 200 mg/kg body wt./day for 7 days did not affect any of the factors investigated. AA

1195

Loprieno (G), Boncristiani (G) and Loprieno (N). **Genotoxicity studies *in vitro* and *in vivo* on carminic acid (Natural Red 4).** *Food and Chemical Toxicology* 30(9): 1992: 759-764

The potential genotoxic activity of carminic acid (CAS no. 1260-17-9; EINECS no. 215-023-3; C.I. no. 75410), a component of natural red colouring products (cochineal: CAS no. 1343-78-8; EINECS no. 215-680-6; C.I. no. 75470), used in food, cosmetics and drugs, has been evalauted by means of a series of short-term tests *in vitro* and *in vivo*, namely Salmonella reverse mutation, chromosome aberrations and sister chromatid exchanges *in vitro* on Chinese hamster ovary cells, and the mouse micronucleus test. All studies have produced negative results. The data obtained strongly support the non-mutagenic/non-carcinogenic activity of this compound. Genotoxicity data previously obtained for carminic acid, concerning the induction of a series of other genetic endpoints in different test systems, have also been considered, as have recent findings that indicate lack of carcinogenic activity in the cochineal preparation containing 29.8% carminic acid. AA

1196

Sternitzke (A), Legrum (W) and Netter (KJ). **Effects of phenolic smoke condensates and their components on hepatic drug metabolizing systems.** *Food and Chemical Toxicology* 30(9): 1992: 771-781

Treatment of food with wood smoke is a long-established methods of preservation and flavouring food. Recently, hardwood smoke condensates, purified of polycyclic hydrocarbons, have become of importance for direct flavouring of sausage-meat. The acute toxicity of the purified phenolic fraction in mice after intraperitoneal administration was therefore investigated. The LD_{50} was found to be 940 mg/kg body wt., which is about 3 times the LD_{50} of phenol (about 300 mg/kg). Only high concn. of phenols or smoke condensate fractions are able to damage cytochrome P-450 by conversion to cytochrome P-420, whereas lower concn. exhibit inhibitory effects on monooxygenase activity. Inductive properties of the phenolic fractions could not be demonstrated. Concn. *in vivo* of free phenolic compounds do not reach inhibitory levels, since the hexobarbital-induced sleeping-time and $^{14}CO_2$-exhalation after administration of *p*-[methoxy-^{14}C] acetanilide are not altered. It is concluded that the phenolic compound intake with food regularly treated with smoke condensate fractions is below a toxicologically relevant level. AA

FOOD LAWS AND REGULATIONS

Nil

AUTHOR INDEX

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